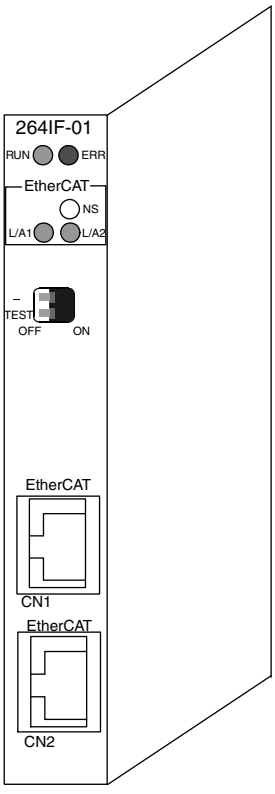
YASKAWA

Machine Controller MP2000 Series

EtherCAT Module

264IF-01 USER'S MANUAL

Model JAPMC-CM2305-E



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MANUAL NO. SIEP C880700 42A

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Using this Manual

This manual describes MP2000 Series Machine Controller
EtherCAT Module 264IF-01. Read this manual thoroughly before using 264IF-01. Keep this manual in a safe place for future reference.

■ Basic Terms

Unless otherwise specified, the following definitions are used:

- MP2000 Series Machine Controller: MP2100M, MP2200, MP2300, MP2310, MP2300S, and MP2500MD Machine Controllers
- PLC: Programmable Logic Controller
- MPE720: The Programming Device Software or a personal computer running the Programming Device Software

■ Manual Configuration

This manual consists of the chapters listed in the following table. Read the chapters of this manual as required by the purpose.

Purpose / Chapter	Selecting Models and Peripheral Devices	Studying Specifications and Ratings	Designing the System	Panel Installation and Wiring	Trial Operation	Maintenance and Inspection
Chapter 1 EtherCAT	✓	–	✓	–	–	–
Chapter 2 264IF-01 Module	✓	✓	✓	✓	✓	✓
Chapter 3 Mounting and Starting the Module	–	✓	✓	✓	✓	✓
Chapter 4 EtherCAT Transmission Definition	–	✓	✓	–	✓	✓
Chapter 5 Operation Specifications of the Module	✓	–	✓	✓	✓	✓
Chapter 6 Troubleshooting	–	✓	✓	✓	✓	✓
Appendices	–	–	✓	✓	–	–

■ Graphic Symbols Used in this Manual

The graphic symbols used in this manual indicate the following type of information.

- This symbol is used to indicate important information that should be memorized or minor precautions, such as precautions that will result in alarms if not heeded.

■ Indication of Reverse Signals

In this manual, the names of reverse signals (ones that are valid when low) are written with a forward slash (/) before the signal name, as shown in the following example:

<Notation Examples> $\overline{\text{S-ON}}$ = /S-ON
$\overline{\text{P-CON}}$ = /P-CON

■ Related Manuals

The following table lists the manuals relating to the 264IF-01 Module for the MP2000 Series Machine Controller. Refer to these manuals as needed.

Manual Name	Manual Number	Contents
Machine Controller MP2100/MP2100M User's Manual Design and Maintenance	SIEPC88070001	Describes how to use the MP2100 and MP2100M Machine Controllers.
Machine Controller MP2200 User's Manual	SIEPC88070014	Describes how to use the MP2200 Machine Controller and the modules that can be connected.
Machine Controller MP2300 Basic Module User's Manual	SIEPC88070003	Describes how to use the MP2300 Basic Module and the modules that can be connected.
Machine Controller MP2310 Basic Module User's Manual	SIEPC88073201	Describes how to use the MP2310 Basic Module and the modules that can be connected.
Machine Controller MP2300S Basic Module User's Manual	SIEPC88073200	Describes how to use the MP2300S Basic Module and the modules that can be connected.
Machine Controller MP2500/MP2500M/MP2500D/MP2500MD User's Manual	SIEPC88075200	Describes how to use the MP2500, MP2500M, MP2500D, and MP2500MD Machine Controllers.
Machine Controller MP2000 Series Motion Module Built-in SVB/SVB-01 User's Manual	SIEPC88070033	Provides a detailed description on the MP2000 Series Machine Controller built-in SVB Module and slot-mounting optional SVB-01 Module.
Machine Controller MP2000 Series Communication Module User's Manual	SIEPC88070004	Provides the information on the Communication Module that can be connected to MP2000 Series Machine Controller and the communication methods.
Machine Controller MP900/MP2000 Series User's Manual: Ladder Programming	SIEZ-C887-1.2	Describes the instructions used in MP900/MP2000 ladder programming.
Machine Controller MP900/MP2000 Series User's Manual: Motion Programming	SIEZ-C887-1.3	Describes the instructions used in MP900/MP2000 motion programming.
Machine Controller MP2000 Series MPE720 Programming Device Version 6 User's Manual	SIEPC88070030	Describes how to install and operate the programming tool MPE720 version 6 for MP2000 Series Machine Controllers.
Machine Controller MP900/MP2000 Series MPE720 Software for Programming Device User's Manual	SIEPC88070005	Describes how to install and operate the MP900/MP2000 Series programming system (MPE720).
Machine Controller MP900/MP2000 Series New Ladder Editor Programming Manual	SIEZ-C887-13.1	Describes the programming instructions of the New Ladder Editor, which assists design and maintenance of MP900/MP2000 Series.
Machine Controller MP900/MP2000 Series New Ladder Editor User's Manual	SIEZ-C887-13.2	Describes the operating methods of the New Ladder Editor, which assists design and maintenance of the MP900/MP2000 Series Machine Controllers.
Machine Controller MP2000 Series 262IF-01 FL-net Communication Module User's Manual	SIEPC88070036	Describes the 262IF-01 FL-net communication module that can be connected to MP2000 Series Machine Controllers.
Machine Controller MP2000 Series 263IF-01 EtherNet/IP Communication Module User's Manual	SIEPC88070039	Describes the 263IF-01 EtherNet/IP communication module that can be connected to MP2000 Series Machine Controllers.

■ Copyrights

- EtherCAT is an international registered trademark of Mr. Hans Beckhoff.
- Ethernet is a registered trademark of the Xerox Corporation.
- Other product names and company names are the trademarks or registered trademarks of the respective company. “TM” and the ® mark do not appear with product or company names in this manual.

Safety Information

The following conventions are used to indicate precautions in this manual. Information marked as shown below is important for the safety of the user. Always read this information and heed the precautions that are provided. The conventions are as follows:

⚠ WARNING	Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.
⚠ CAUTION	Indicates precautions that, if not heeded, could result in relatively serious or minor injury, or property damage. If not heeded, even precautions classified under ⚠ CAUTION can lead to serious results depending on circumstances.
PROHIBITED	Indicates prohibited actions. Specific prohibitions are indicated inside ⃠. For example, indicates no fire or open flame.
MANDATORY	Indicates mandatory actions. Specific actions are indicated inside ● . For example, indicates that grounding is required.

Safety Precautions

The following precautions are for checking products on delivery, storage, transportation, installation, wiring, operation, application, inspection, and disposal. These precautions are important and must be observed.

■ General Precautions

⚠ WARNING

- Before starting operation while connected to the machine, ensure that an emergency stop procedure has been provided and is working correctly.
  There is a risk of injury.
- Do not touch anything inside the product.
  There is a risk of electrical shock.
- Always keep the front cover attached when power is being supplied.
  There is a risk of electrical shock.
- Observe all procedures and precautions given in this manual for trial operation.
  Operating mistakes while the Servomotor and machine are connected can cause damage to the machine or even accidents resulting in injury or death.
- Do not remove the front cover, cables, connector, or options while power is being supplied.
  There is a risk of electrical shock.
- Do not damage, pull on, apply excessive force to, place heavy objects on, or pinch cables.
  There is a risk of electrical shock, operational failure of the product, or burning.
- Do not attempt to modify the product in any way.
  There is a risk of injury or device damage.
- Do not approach the machine when there is a momentary interruption to the power supply. When power is restored, the MP2000 Series Machine Controller or machine connected to it may start operation suddenly. Provide suitable safety measures to protect people when operation restarts.
  There is a risk of injury.
- Do not allow installation, disassembly, or repairs to be performed by anyone other than specified personnel.
  There is a risk of electrical shock or injury.

■ Storage and Transportation

⚠ CAUTION

- Do not store or install the product in locations subject to the following. There is a risk of fire, electric shock, and machine product damage.
  - Direct sunlight
  - Ambient temperatures exceeding the storage or operating conditions
  - Ambient humidity exceeding the storage or operating conditions
  - Extreme changes in temperature that would result in condensation
  - Corrosive or flammable gas
  - Excessive dust, dirt, salt, or metallic powder
  - Water, oil, or chemicals
  - Vibration or shock
- Do not overload the product during transportation.
  There is a risk of injury or an accident.
- Never subject the product to an atmosphere containing halogen (fluorine, chlorine, bromine, or iodine) during transportation or installation.
  There is a risk of device damage or an accident.
- If disinfectants or insecticides must be used to treat packing materials such as wooden frames, pallets, or plywood, the packing materials must be treated before the product is packaged, and methods other than fumigation must be used.
  Example: Heat treatment, where materials are kiln-dried to a core temperature of 56°C for 30 minutes or more.
  If the electronic products, which include stand-alone products and products installed in machines, are packed with fumigated wooden materials, the electrical components may be greatly damaged by the gases or fumes resulting from the fumigation process. In particular, disinfectants containing halogen, which includes chlorine, fluorine, bromine, or iodine can contribute to the erosion of the capacitors.

■ Installation

⚠ CAUTION

- Never use the product in locations subject to water, corrosive atmospheres, or flammable gas, or near burnable objects.
  There is a risk of electrical shock or fire.
- Do not step on the product or place heavy objects on the product.
  There is a risk of injury.
- Do not block the air exhaust port on the product. Do not allow foreign objects to enter the product.
  There is a risk of element deterioration inside, an accident, or fire.
- Always mount the product in the specified orientation.
  There is a risk of an accident.
- Do not subject the product to strong shock.
  There is a risk of an accident.

■ Wiring

⚠ CAUTION

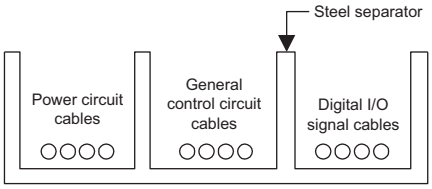
- Check the wiring to be sure it has been performed correctly.
  There is a risk of motor run-away, injury, or an accident.
- Always use a power supply of the specified voltage.
  There is a risk of burning.
- In places with poor power supply conditions, take all steps necessary to ensure that the input power is supplied within the specified voltage range.
  There is a risk of device damage.
- Install breakers and other safety measures to provide protection against shorts in external wiring.
  There is a risk of fire.
- Provide sufficient shielding when using the product in the locations subject to the following.
  There is a risk of device damage.
  - Noise, such as from static electricity
  - Strong electromagnetic or magnetic fields
  - Radiation
  - Near power lines

■ Selecting, Separating, and Laying External Cables

⚠ CAUTION

- Consider the following items when selecting the I/O signal lines (external cables) to connect the product to external devices.
  - Mechanical strength
  - Noise interference
  - Wiring distance
  - Signal voltage, etc.
- Separate the I/O signal lines from the power lines both inside and outside the control box to reduce the influence of noise from the power lines.
  If the I/O signal lines and power lines are not separated properly, malfunctioning may result.

Example of Separated External Cables



■ Maintenance and Inspection Precautions

⚠ CAUTION

- Do not attempt to disassemble the product.
  There is a risk of electrical shock or injury.
- Do not change wiring while power is being supplied.
  There is a risk of electrical shock or injury.

■ Disposal Precautions

⚠ CAUTION
• Dispose of the product as general industrial waste.

■ General Precautions

Observe the following general precautions to ensure safe application.
• The products shown in illustrations in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual. • The drawings presented in this manual are typical examples and may not match the product you received. • If the manual must be ordered due to loss or damage, inform your nearest Yaskawa representative or one of the offices listed on the back of this manual.

Warranty

(1) Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereafter called “delivered product”) is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of change if a defect attributable to Yaskawa occurs during the warranty period above. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.
This warranty does not cover failures that result from any of the following causes.

1. Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
2. Causes not attributable to the delivered product itself
3. Modifications or repairs not performed by Yaskawa
4. Abuse of the delivered product in a manner in which it was not originally intended
5. Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
6. Events for which Yaskawa is not responsible, such as natural or human-made disasters

(2) Limitations of Liability

1. Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
2. Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
3. The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
4. Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

(3) Suitability for Use

1. It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
2. The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
3. Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
    - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
    - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
    - Systems, machines, and equipment that may present a risk to life or property
    - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
    - Other systems that require a similar high degree of safety
4. Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
5. The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
6. Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

(4) Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

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1

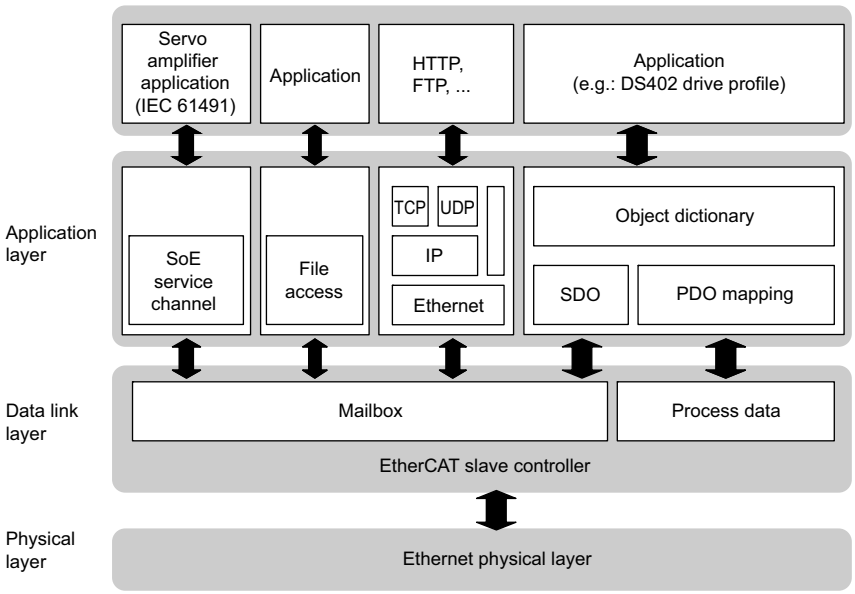
EtherCAT

This chapter describes an outline of the EtherCAT.

1.1 Outline - - -

1.1 Outline

EtherCAT is a real-time field bus, based on the IEEE802.3 standard Ethernet, which was advocated by Beckhoff Automation GmbH. Currently it is being standardized as IEC61185 Type 12 of the IEC (International Electrotechnical Commission).
The spread of EtherCAT is advancing with the focus on Europe, and it is applied to press machines, injection molding machines, CNC units, robots, and so on. ETG (EtherCAT Technology Group) is also working to increase the spread of EtherCAT.
An EtherCAT device model (ISO/OSI reference) is shown below.



1.2 Features

The features of EtherCAT are listed below.

- Since Ethernet (ISO/IEC8802-3) is used in the physical layer, it is possible to use general-purpose Ethernet cables.
- Ethernet frames are transmitted to the next node in a high-speed repeat system, enabling high-efficiency communication.

At 100 Mbps in the full duplex mode*:	Band usage ratio: 80 to 90%	
(reference data)	Data update time	
	Reading/writing 256 digital I/O points:	11 µs
	Reading/writing 1,000 digital I/O points at 100 nodes:	30 µs
	Reading/writing analog I/Os (16-bit, 20 kHz) at 200 nodes:	50 µs
	Reading/writing servo axes (8-byte) at 100 nodes:	100 µs
	Reading/writing 12,000 digital I/O points:	350 µs

* This is the transmission cycle (guide) based on EtherCAT specifications. Some lag occurs in the actual data refresh cycle in accordance with the communication cycle of the master device and the data refresh cycle of the slave devices.

- Synchronization with jitter of no greater than 1 ms is possible with a clock synchronization system conforming to IEEE1588.
- Unrestricted network topology (line type, star type, tree type, and daisy-chain type connections are possible.)

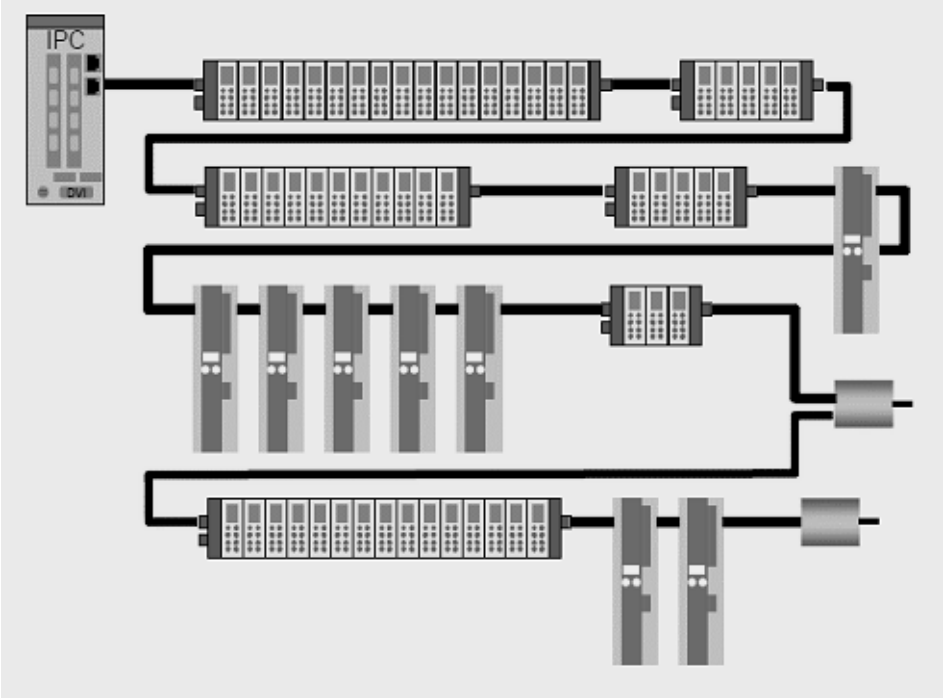


Fig. 1.1 Example of Line Type Connection

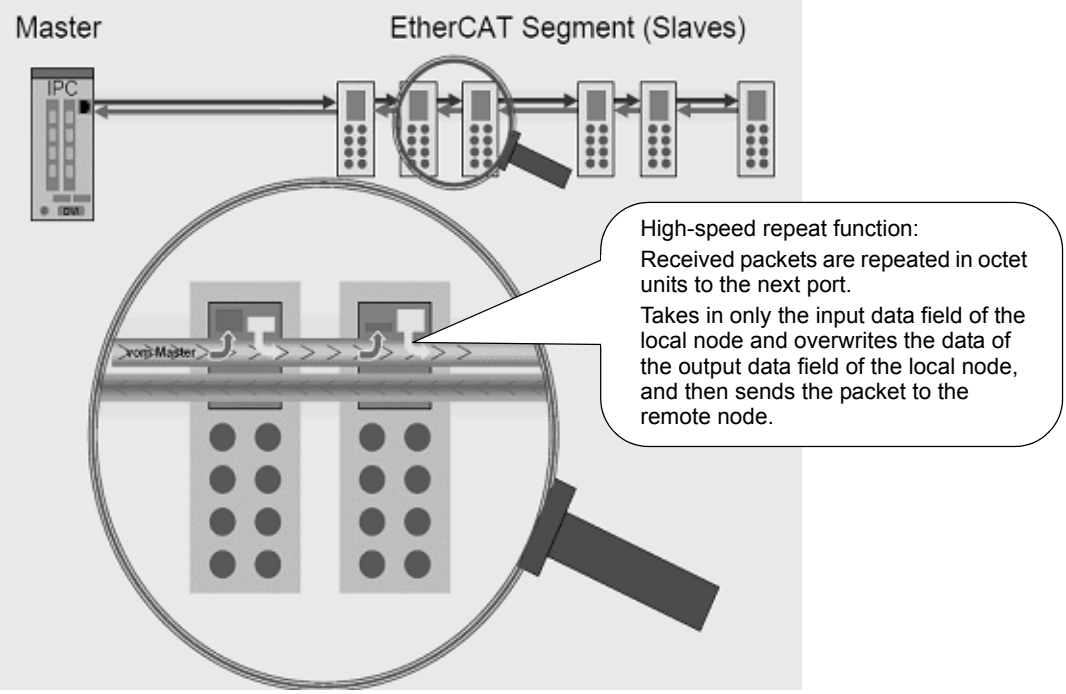

Master
EtherCAT Segment (Slaves)
IPC
High-speed repeat function:
Received packets are repeated in octet units to the next port.
Takes in only the input data field of the local node and overwrites the data of the output data field of the local node, and then sends the packet to the remote node.

Fig. 1.2 High-speed Repeat Function (Conceptual)

1.3 Classification of EtherCAT Communication

EtherCAT provides the following two communication functions.

(1) Process Data Communication Function

This is equivalent to cyclic (I/O) communication. An EtherCAT system has a 4-gigabyte logical process data area (cyclic data area).
Mapping the logical process data area at the EtherCAT master station to each of the slave nodes enables cyclic (I/O) communications between the master and slave stations.

(2) Mailbox Communication Function

This is equivalent to message communication.
The EtherCAT master station sends commands to the slave stations, and the slave stations return a response to the master station.

- Reading from/writing to the system (EtherCAT system) register
- Reading/writing process data
- Reading from/writing to user memory

2

264IF-01 Module

This chapter describes the appearance and specifications of the 264IF-01 Module.

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2.1 Features

The 264IF-01 Module is a device that is dedicated as an EtherCAT slave station. It carries out process data communication and mailbox communication. This module cannot be a master station.
In an EtherCAT system, the MP2000 Series Machine Controller on which the 264IF-01 Module is installed operates as slave station I/O. The MP2000 Series Machine Controller can also be used, for example, for servo control when connected with MECHATROLINK as a controller for motion control.
The concept of EtherCAT connection is shown below.

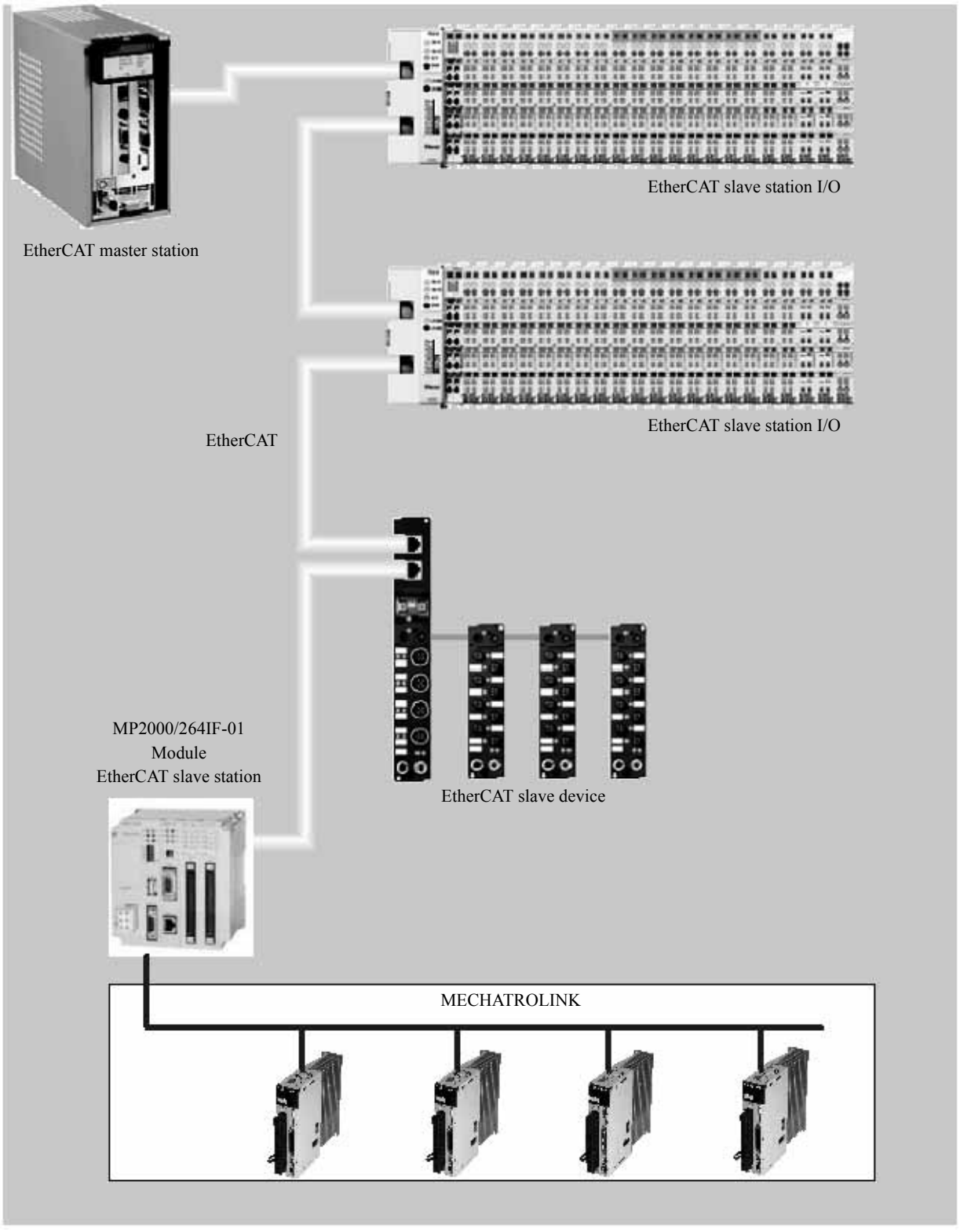


Fig. 2.1 Example of 264IF-01 Module in an EtherCAT System

2.1.1 Process Data Communication (Cyclic Communication)

The 264IF-01 Module can carry out cyclic communication with the EtherCAT master device using the process data communication function. It is not possible to refer to the data of other slave stations from a 264IF-01 Module.

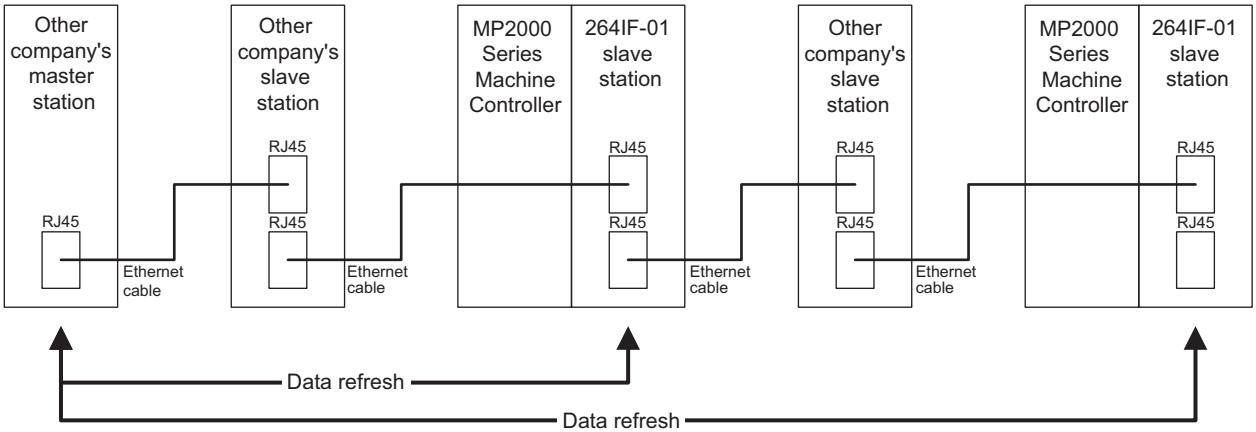


Fig. 2.2 Cyclic Communication between the Master and Slave Stations in a Line-connection EtherCAT System

2.1.2 Mailbox Communication (System Message Communication)

The 264IF-01 Module can carry out message communication dedicated to EtherCAT systems by using the mailbox communication function. User message communication, such as reading from/writing to the user memory (M registers) is not possible.

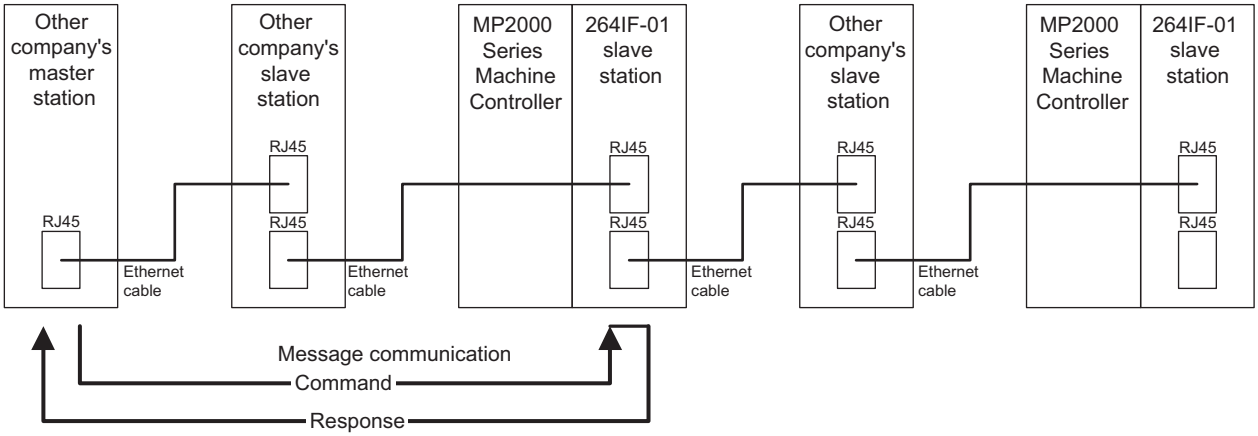
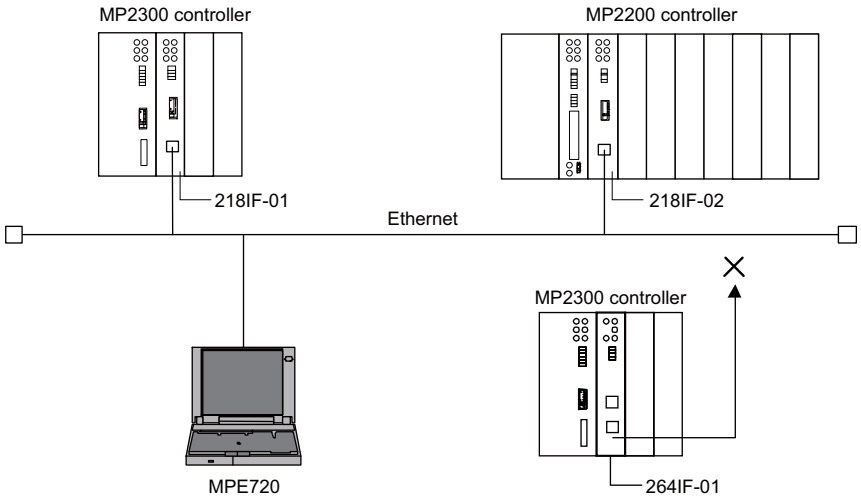


Fig. 2.3 Message Communication between Master and Slave Stations in a Line-connection EtherCAT System

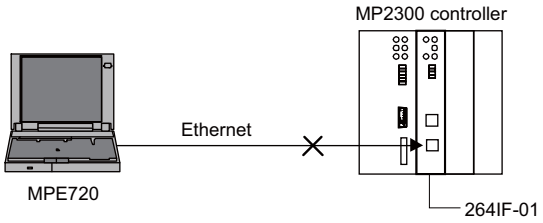
2.1.3 Restrictions

The 264IF-01 Module has been designed as a communication module dedicated for use in EtherCAT. Note the following points:

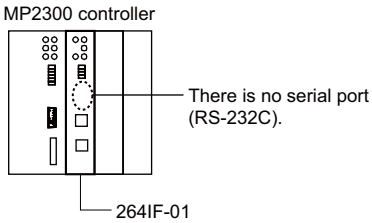
- The 264IF-01 Module cannot be connected to a regular Ethernet network to be connected from the 218IF-01 or 218IF-02 Module.
  Though the 264IF-01 Module uses a standard Ethernet cable, it does not allow connection for communications based on general-purpose TCP/IP or UDP/IP because it serves only as an EtherCAT-dedicated module.



- The MPE720 engineering tool cannot be connected to the 264IF-01 Module directly.
  When connecting the MPE720, separately prepare a module with any of the RS-232C, Ethernet, and CP-215 ports for connection.



- No serial port (RS-232C) has been mounted.



2.2 Specifications

This section provides specifications for the 264IF-01 Module.

2.2.1 Hardware Specifications

Table 2.1 Hardware Specifications of the 264IF-01 Module

Item	Specifications
Name	264IF-01
Model	JAPMC-CM2305-E
Communication Port	EtherCAT slave station, 1 channel, 2 ports
Indicators	Module status indicators LED RUN (green) ERR (red) NS (red/green) L/A1 (green) L/A2 (green)
Switch	TEST
Dimensions (mm)	125 × 95 mm (H × D)
Mass	80 g

2.2.2 Transmission Specifications

Table 2.2 Transmission Specifications of the 264IF-01 Module

Item			Specifications		Remarks
EtherCAT Physical Layer	Baud Rate		100 Mbps full duplex		
	Standard Specification		IEEE802.3u		
	Communications Medium		CAT5e STP Either straight cable or cross cable can be used.		The type of cable is automatically identified by the AUTO MDIX function.
	Connection Method		Line type connection		
	Distance between Nodes		100 m		
	Communication Port		1 channel, 2 ports		
EtherCAT Communication	Master/Slave		Slave		
	MAC Address		None (not necessary to write a MAC address)		
	IP Address		None (no need to set)		
	Node Number Allocation		Automatic allocation from the master station		Fixed allocation of node numbers is not possible.
	Communication Modes / Protocol		Process data (cyclic)	Mailbox (message)	
	EtherCAT		○	○ (system message)	
	CoE (CANOpen over EtherCAT)		×	×	
	EoE (Ethernet over EtherCAT)		−	×	
	FoE (Filetransfer over EtherCAT)		−	×	
	SoE (Servo Drive over EtherCAT)		×	×	
	VoE (Vendor Specific over EtherCAT)		×	×	
	○: Can be used with the 264IF-01 Module. ×: Cannot be used with the 264IF-01 Module. −: Does not exist as a protocol specification. With EtherCAT a protocol can be specified for each node. Since there is no need to standardize the protocol throughout a network, it is possible to connect to an EtherCAT system regardless of the protocol at the remote node.				
Cyclic Communication	Communication Cycle		Automatically set in accordance with the number of data and number of nodes		Differs depending on the master configuration.
	Number of Input/Output Bytes		Input: 0 to 198 words Output: 0 to 198 words Condition 1: If either includes "0": Input + output ≤ 198 words Condition 2: If either is an odd number size: Input + output ≤ 199 words Condition 3: Other than conditions 1 and 2: Input + output ≤ 200 words		
Message	Message Connection Mode	Peer	Can only receive system messages.		
		Broadcast	Can only receive system messages.		
		Multicast	Can only receive system messages.		

2.2.3 Operating Environment Specifications

Table 2.3 Operating Environment Specifications for the 264IF-01 Module

Item		Specifications
Environmental Conditions	Ambient Operating Temperature	0 to +55 °C
	Ambient Storage Temperature	−25 to +85°C
	Ambient Operating Humidity	30% to 95% RH (with no condensation)
	Ambient Storage Humidity	5% to 95% RH (with no condensation)
	Pollution Level	Pollution level: 1 (conforming to JIS B3501)
	Operating Altitude	2,000 m above sea level or lower
Mechanical Operating Conditions	Vibration Resistance	Vibration amplitude/acceleration 16.7 Hz 14.7 m/s^2 10 ≤ f < 57 Hz 0.075 mm of single-amplitude 57 ≤ f ≤ 150 Hz 9.8 m/s^2 of fixed acceleration
	Shock Resistance	Peak acceleration of 147 m/s^2 twice for 11 ms each in the X, Y, and Z directions
Electrical Operating Conditions	Noise Resistance	Power supply noise (FT noise): ±2 kV min., for one minute Radiation noise (FT noise): ±1 kV min., for one minute Ground noise (impulse noise): ±1 kV min., for ten minutes Electrostatic noise (contact discharge method): ±6 kV min., ten times
Installation Requirements	Ground	Ground to 100 Ω max.
	Cooling Method	Natural cooling

2.3 Device Description File

The device description file is a profile that states the information of a device, and it is provided by the slave device manufacturer. An EtherCAT network can be configured by installing this file in the configuration tool of the master device. The device description file is written in the XML format. (It is a setting file equivalent to the EDS file used with DeviceNet, Ethernet/IP.)

Obtain the device description file by either of the following methods.

- The MPE720 installation disk
- Downloading from the Yaskawa website (the e-mechatronics site: http://www.e-mechatronics.com/index.jsp)

2.4 Overview

2.4.1 Appearance

The following figure shows the appearance of the 264IF-01 Module.

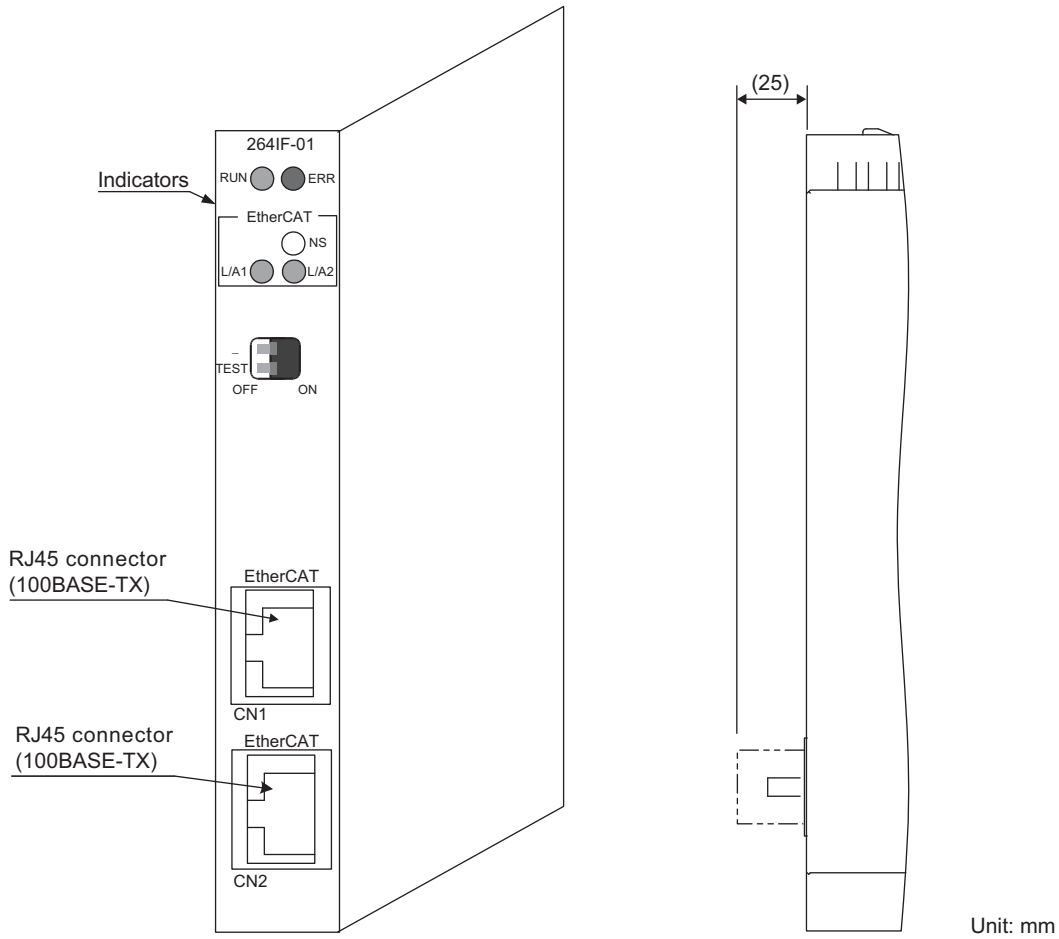


Fig. 2.4 Appearance of the 264IF-01 Module

2.4.2 Status Indicators (LEDs)

The following table shows the status of the 264IF-01 Module indicated by the LED indicators.

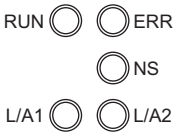


Table 2.4 Status Indicators (LEDs)

Indicator	Color	Meaning When Lit	Meaning When Flashing	Meaning When Not Lit
RUN	Green	Operating normally	–	–
ERR	Red	–	Hardware error	Normal
NS	Green	EtherCAT communication status • OPERATIONAL	EtherCAT communication status • PRE-OPERATIONAL flashing (500 ms) • SAFE-OPERATIONAL flashing (1 s)	EtherCAT communication status • INIT
	Red	–	–	–
L/A1	Green	Link up	Transmission in progress	Link down
L/A2	Green	Link up	Transmission in progress	Link down

2.4.3 Switch Settings

The following table shows the switches mounted on the 264IF-01 Module.

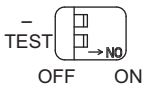


Table 2.5 Switch Settings

Label (Switch No.)	Name	Status	Function	Factory Setting
– (2)	Program loading selection at shipment	ON	Reserved by the system. • Always set to OFF.	OFF
		OFF		
TEST (1)	Operating mode selection	ON	Test mode	OFF
		OFF	Normal operation mode • Always set to OFF except when performing a self-diagnosis test.	

• Always set the unused switches (No. 3, 4) to OFF.

2.4.4 Offline Self-diagnostic Test

The offline self-diagnostic test will be performed if the power is turned ON when the TEST switch is set to ON and all other switches are set to OFF.
If the result of self diagnosis is normal, the lamps light and go off in the following repeated sequence:
RUN lights → ERR lights → NS lights in green → NS lights in red → all lamps go off.
If the offline self-diagnostic test finds a problem in the 264IF-01 Module, the indicators will be as shown in the following table.

Table 2.6 Offline Self-diagnostic Test

Error Contents	Indicator Status When Error Is Detected				
	RUN	ERR	NS	L/A1	L/A2
ROM Check Error	Not lit	Flashing (1)	Not lit	Depends on the connection status of CN1.	Depends on the connection status of CN2.
RAM Check Error		Flashing (2)			
DRAM Check Error		Flashing (3)			
Communication IC Check Error		Flashing (4)			

• The number in parentheses following “Flashing” indicates the number of flashes.

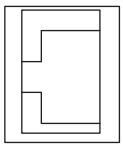
2.5 Communication Connector Specifications

2.5.1 Connector (CN1, 2) Specifications

This section explains the connector specifications for the 264IF-01 Module.

(1) Connector Specifications

Table 2.7 Connector (CN1, 2) Specifications

Connector Shape	Name	Connector Name	No. of Pins	Connector Model		
				Module	Cable	Manufacturer
	EtherCAT	CN1 CN2	8	TM11R-5M2-88	–	HIROSE ELECTRIC CO., LTD.

(2) Connector Pin Arrangement

The connector is used to connect the 264IF-01 Module to the devices in the EtherCAT network via an EtherCAT connection.

Table 2.8 Connector Pin Arrangement

Pin Number	Signal Name	I/O	Description	Pin Number	Signal Name	I/O	Description
1	TXD+	O	Send data plus side	5	TRES1	–	Terminating resistance, 75 Ω
2	TXD–	O	Send data minus side	6	RXD–	I	Receive data minus side
3	RXD+	I	Receive data plus side	7	TRES2	–	Terminating resistance, 75 Ω
4	TRES1	–	Terminating resistance, 75 Ω	8	TRES2	–	Terminating resistance, 75 Ω

2.5.2 Cable Specifications

Yaskawa does not provide EtherCAT cables. Obtain commercially available category 5e cross or straight cables.

- The AUTO MDI/MDI-X function of the 264IF-01 Module automatically distinguishes between cross and straight cables.

3

Mounting and Starting the Module

This chapter describes how to connect the 264IF-01 Module and start the system, focusing on 264IF-01 Module mounting, communication process setting, and self-configuration.

3.1 Applicable Machine Controllers and Supported Versions ----------3-2
3.1.1 Applicable Machine Controllers ---------- 3-2
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3.1 Applicable Machine Controllers and Supported Versions

3.1.1 Applicable Machine Controllers

The MP2000 Series Machine Controllers to which the 264IF-01 Modules can be mounted are listed in the following table.

Name		Model	Max. No. of Connectable Modules	Remarks
MP2200	Base Unit with 100/200-VAC input*1	JEPMC-BU2200	8 modules when using the CPU-01, CPU-02, CPU-03 or CPU-04	The maximum number of connectable Modules is the total for the maximum expansion to four Racks.*2
	Base Unit with 24-VDC input*1	JEPMC-BU2210		
MP2300		JEPMC-MP2300	2 modules	
MP2310		JEPMC-MP2310-E	3 modules	
MP2300S		JEPMC-MP2300S-E	1 module	
MP2100M		JAPMC-MC2140	8 modules	The 264IF-01 Modules can be mounted to Expansion Racks (which use the MP2200 Base Unit) connected to an Expansion Interface Board (MP2100MEX, model: JAPMC-EX2100) mounted to the Machine Controller. The maximum number of connectable Modules is the total for the maximum expansion to three Racks.*2
MP2500MD		JAPMC-MC2540-D	8 modules	

∗ 1. A special CPU Module (the CPU-01, CPU-02, CPU-03 or CPU-04) is required.
The models are as follows:
CPU-01: JAPMC-CP2200,
CPU-02: JAPMC-CP2210 (with 1 CF card slot, 1 USB port)
CPU-03: JAPMC-CP2220 (with 1 CF card slot, 1 Ethernet port)
CPU-04: JAPMC-CP2230 (with 1 Ethernet port)

∗ 2. An EXIOIF Inter-Rack Connection Module (model: JAPMC-EX2200) is required to add Expansion Racks.

- The 264IF-01 Modules cannot be mounted on the following MP2000 Series Machine Controllers: MP2100, MP2400, MP2500, MP2500M, and MP2500D.

3.1.2 Supported CPU and MPE720 Versions

The CPU versions and MPE720 versions of the Machine Controller corresponding to the 264IF-01 Module are listed in the following table.

Machine Controller		Supported Versions		
		CPU	MPE720 (CPMC-720)	MPE720 Ver.6 (CPMC-770)
MP2200	CPU-01	Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
	CPU-02	Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
	CPU-03	Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
	CPU-04	Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
MP2300		Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
MP2310		Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
MP2300S		Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
MP2100M		Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later
MP2500MD		Ver. 2.73 or later	Ver. 5.53 or later	Ver. 6.23 or later

3.2 Mounting and Removing a Module on the Machine Controller

This section explains the procedure for mounting and removing a 264IF-01 Module.

3.2.1 Mounting a 264IF-01 Module

Use the following procedure to mount a 264IF-01 Module.

- Before replacing a 264IF-01 Module, remove the 264IF-01 Module that needs to be replaced referring to *3.2.2 Removing a 264IF-01 Module*.

(1) Preparation

1. Backup the Programs.

Save the programs written to the Machine Controller in the personal computer using MPE720.

- MPE720 Ver. 5.□□: Right-click the PLC folder and then select ***Transfer - All Files - From Controller to MPE720***.
  MPE720 Ver. 6.□□: Open the project file and then select ***Online - Transfer - Read from Controller***.

2. Save in the Flash Memory.

Save the programs written to the Machine Controller in the flash memory using the MPE720.

- MPE720 Ver. 5.□□: Right-click the PLC folder and then select ***Transfer - Other - Save to Flash***.
  MPE720 Ver. 6.□□: Open the project file and then select ***Online - Transfer - Save to Flash***.

3. Remove the Machine Controller and Expansion Rack.

Turn OFF the power supply and remove all the cables connected to the Machine Controller or Expansion Rack (MP2200 Base Unit). Then, remove the Machine Controller and Expansion Rack from the panel or rack, and place them where there is sufficient space, such as on a work table.

(2) Removing the Option Cover

If an Option Cover is attached to the slot into which the 264IF-01 Module is to be mounted, remove it using the following procedure.

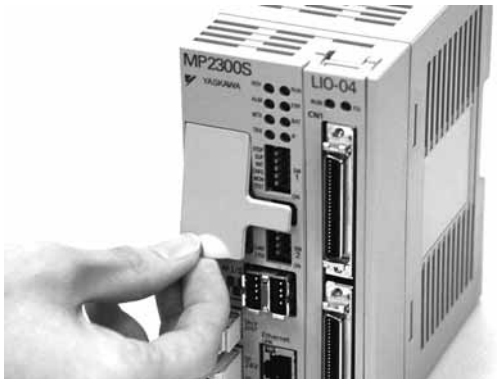
1. Remove the Battery Cover.

<MP2200/MP2300/MP2200 Base Unit>

Insert a hard thin metal object, such as a coin, into the notch on the side of the battery cover and open the cover forward to remove the battery cover.

<MP2310/MP2300S>

Insert a finger in the lug on the lower part of the battery cover as shown in the figure and remove the battery cover.



2. Remove the Option Cover.

Hold the battery cover with the front facing forward, insert the protrusion on the battery cover into the notch at the top of the Option Cover, and release the hook on the Option Cover.

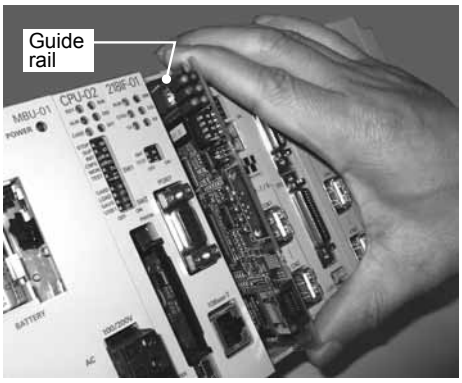
Release the hook on the bottom in the same way and remove the Option Cover.

(3) Mounting Procedures

1. Insert the 264IF-01 Module.

Grip the top and bottom of the 264IF-01 Module, align the Module with the left side of the guide rail inside the option slot, and push the Module straight in.

- If the Module is not inserted along the guide rail correctly, the frame ground bar on the bottom of the slot may get damaged.

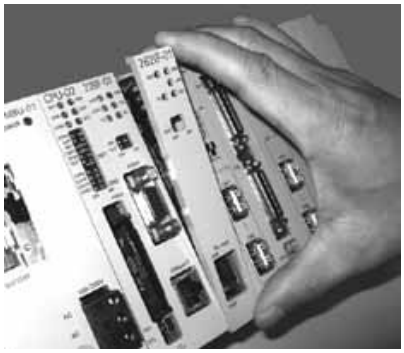


2. Connect to the Mounting Base Connector.

After inserting the Module completely, press the Module firmly until it connects securely with the Mounting Base connector. If the Module is connected securely, the front of the Module should approximately align with the hooks.

3. Mount the Option Panel.

Insert the bottom hook into the hole on the bottom of the option panel and then securely insert the top hook into the hole.



This completes the mounting procedure.

(4) Procedure after Mounting the Module

1. Connect to a Network.

Connect the 264IF-01 Module and EtherCAT device with an Ethernet cable.

- Refer to *2.5.2 Cable Specifications* for cables that can be used.

2. Create Module Configuration Definitions.

a) After Mounting New Modules

Execute self-configuration for each slot in which a 264IF-01 Module has been newly mounted.

- Refer to *3.4 Self-configuration* for more information.

b) After Replacing Modules

Turn OFF the CNFG and INIT DIP switches on the Machine Controller and turn ON the power supply. After turning ON the power, modify the module configuration as required.

- Refer to *4.1.1 Displaying the Module Configuration Window* for information on the Module configuration definitions.

- A Communication Module other than the 264IF-01 Module is required for communication between the Machine Controller and the personal computer running the MPE720. Be sure to mount the Communication Module and refer to *3.3 Setting the Communication Manager*, *3.4 Self-configuration*, and *3.5 Starting the MPE720 and Setting Communication or Network Parameters* to make the required settings before creating module configurations.

3.2.2 Removing a 264IF-01 Module

Use the following procedure to remove a 264IF-01 Module.

(1) Preparation

1. Backup the Programs.

Save the programs written to the Machine Controller in the personal computer using MPE720.

- MPE720 Ver. 5.□□: Right-click the PLC folder and then select ***Transfer - All Files - From Controller to MPE720***.
  MPE720 Ver. 6.□□: Open the project file and then select ***Online - Transfer - Read from Controller***.

2. Remove the Machine Controller and Expansion Rack.

Turn OFF the power supply and remove the cables connected to the Machine Controller or Expansion Rack. Then, remove the Machine Controller and Expansion Rack from the panel or rack and place them where there is sufficient space, such as on a work table.

(2) Removing Procedures

1. Remove the Battery Cover.

<MP2200/MP2300/MP2200 Base Unit>

Insert a hard thin metal object, such as a coin, into the notch on the side of the battery cover and open the cover forward to remove the battery cover.

<MP2310/MP2300S>

Insert a finger in the lug on the lower part of the battery cover as shown in the figure and remove the battery cover.

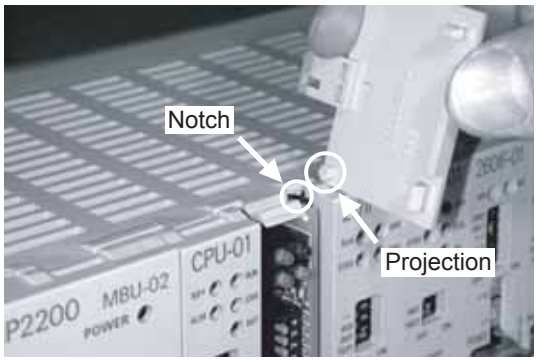
2. Remove the Option Panel.

Hold the battery cover with the front facing forward, insert the protrusion on the battery cover into the notch at the top of the Module's option panel, and release the hook on the option panel.

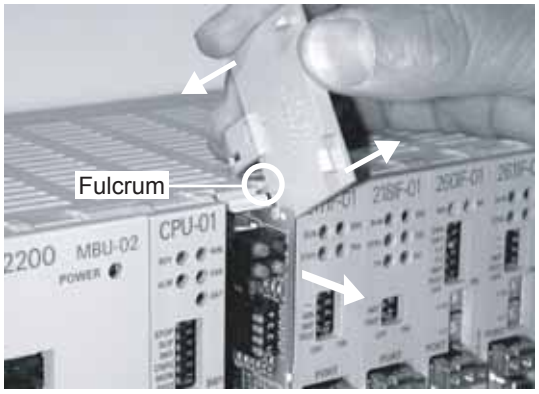
Release the hook on the bottom in the same way and remove the option panel.

3. Remove the 264IF-01 Module from the Mounting Base.

Pull the top of the option panel to remove it. A notch can be seen in the 264IF-01 Module from the gap in the panel. Insert the round projection on the battery cover (see the following figure) into the gap in the panel so that it engages the notch in the Module.

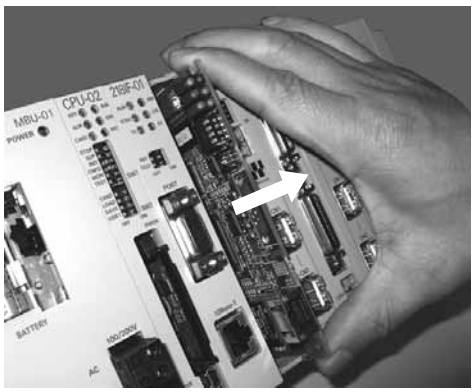


Hold the battery cover as shown in the following figure and rotate it toward the rear, using the round projection as a fulcrum to disconnect the Module from the Mounting Base connector. The Module will come out toward the front.



4. Pull Out the 264IF-01 Module.

Hold onto the top and bottom of the Module with your fingers and pull the Module straight out. Be sure to hold onto the edges of the Module. Do not touch the components mounted to the Module.



Place the Module that you removed into the bag that it was delivered in and store it.

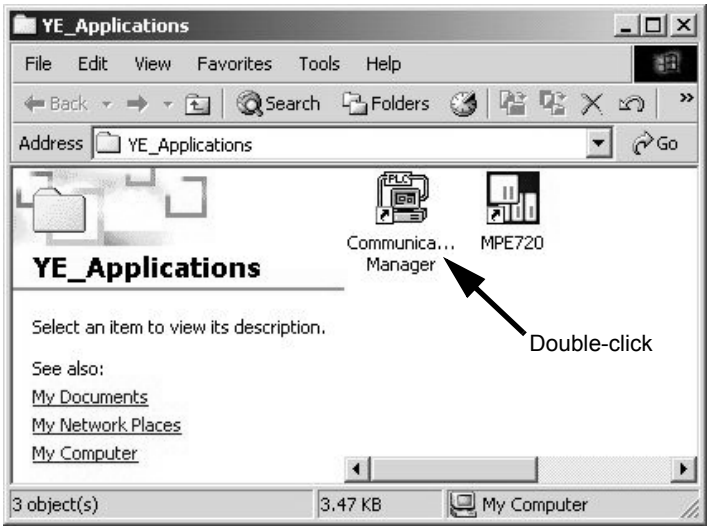
- Always attach an Option Cover (JEPMC-OP2300) to any unused slot.

3.3 Setting the Communication Manager

This section describes the software called the Communication Manager that is used to set the communication method for engineering communication between the personal computer running the MPE720 and the MP2000 Series Machine Controller.
Use a Communication Module other than the 264IF-01 Module for communication between the Machine Controller and the personal computer running the MPE720 and set an appropriate communication method depending on the Module used.
Set the communication conditions with the Communication Manager after the MPE720 Programming Device has been installed. Once they have been set, it is unnecessary to set from the next startup except when other conditions are to be added.

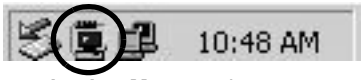
3.3.1 Opening the Communication Manager

1. Double-click the **Communication Manager** icon in the **YE_Applications** folder on the desktop to start the Communication Manager. Alternatively, select ***All Programs - YE-Applications - Communication Manager*** under the Windows **Start** button.



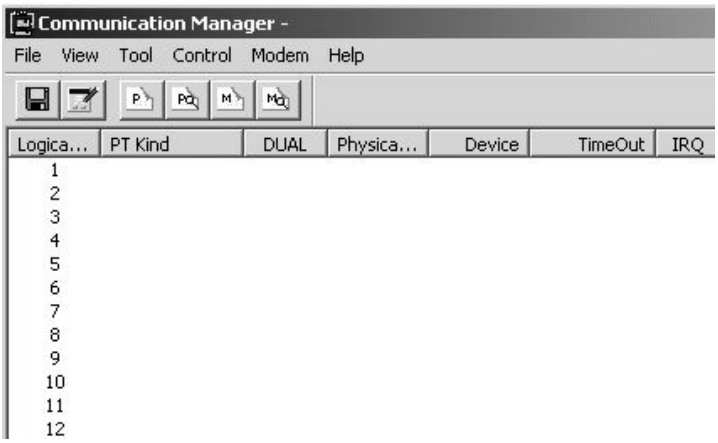
The **Communication Manager** icon will be displayed in the task tray at the right bottom of the window.

2. Double-click the **Communication Manager** icon in the task tray and the **Communication Manager** window like the one shown in the step 3 will be displayed.



Communication Manager icon

3. Logical ports for up to 16 channels can be set in the **Communication Manager** window. Select and set unused logical ports from the top.



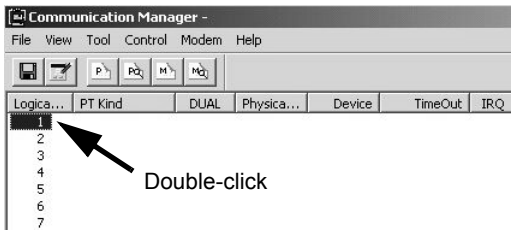
3.3.2 Setting the Communication Manager

This section describes the procedure to set the Communication Manager for connecting the MPE720 and MP2000 Series Machine Controller for each type of communication port.

(1) Setting the Serial Communication Port (RS-232C Connection)

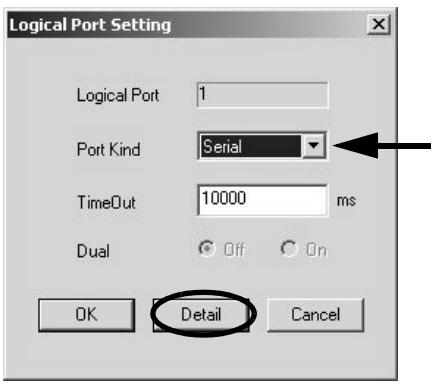
These settings are required to perform engineering communication via the serial (RS-232C) port of each Communication Module using the MPE720. Use the following procedure to make the settings.

1. Double-click Logical Port No.**1** in the **Communication Manager** window.



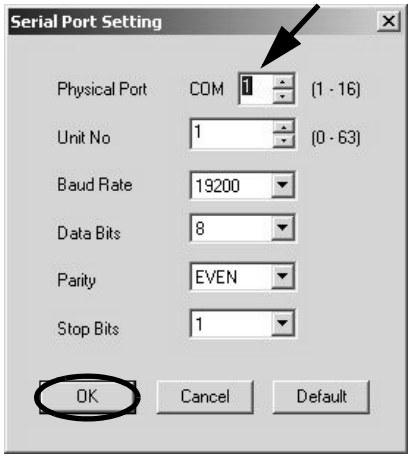
The **Logical Port Setting** dialog box will appear.

2. Select **Serial** under **Port Kind** and then click the **Detail** button.

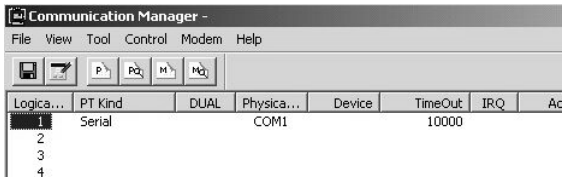


The **Serial Port Setting** dialog box will appear.

3. Match the settings under **Physical Port** to the computer's serial communication port. Leave the other items on the default settings. Once the settings have been completed and checked, click the **OK** button to close the dialog box.



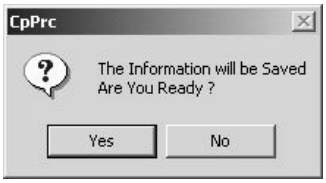
4. The **Logical Port Setting** dialog box will be displayed again. Click the **OK** button to return to the **Communication Manager** window. Check that **Serial** is assigned to Logical Port No. **1**.



■ Saving the Communication Port Settings and Restarting the Communication Manager

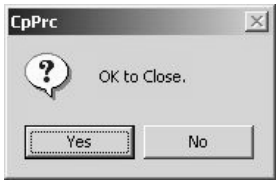
Save the communication port settings, and restart the Communication Manager to validate the settings.

1. Select ***File - Save***. A save confirmation dialog box will be displayed. Click the **Yes** button to save the communication port settings.

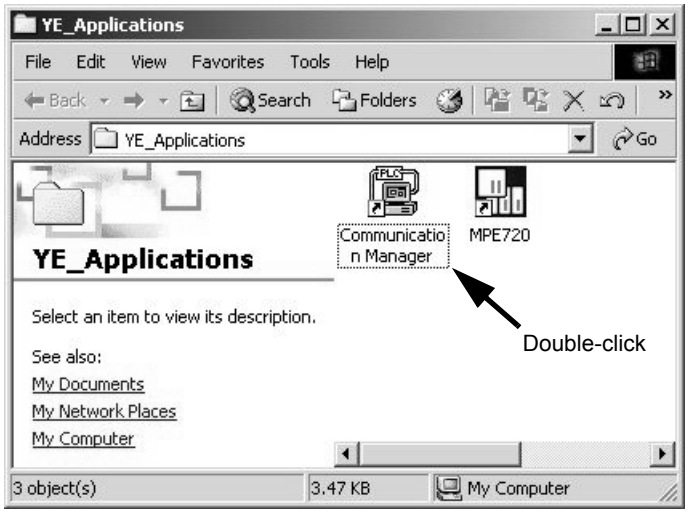


These settings will be used as the communication port information whenever the Communication Manager is started.

2. Close the **Communication Manager** window and restart to validate the settings.
Select ***File - Exit*** to close the **Communication Manager** window. A confirmation dialog box will be displayed. Click the **Yes** button to close the **Communication Manager** window.



3. Double-click the **Communication Manager** icon in the **YE_Applications** folder to reopen the **Communication Manager** window.



(2) Setting the Ethernet Communication Port

These settings are required to perform engineering via the 10Base-T communication port (Ethernet) of the 218IF-01 Module. For Ethernet connection, a general-purpose Ethernet board or PCMCIA Ethernet card must be mounted on the personal computer. Prior to make settings, the IP address of the personal computer must be set.

[a] Mounting an Ethernet Card

Mount a general-purpose Ethernet board or PCMCIA Ethernet card on the specified connector of the personal computer. Also, install the driver provided with the Ethernet card.

[b] Setting the IP Address

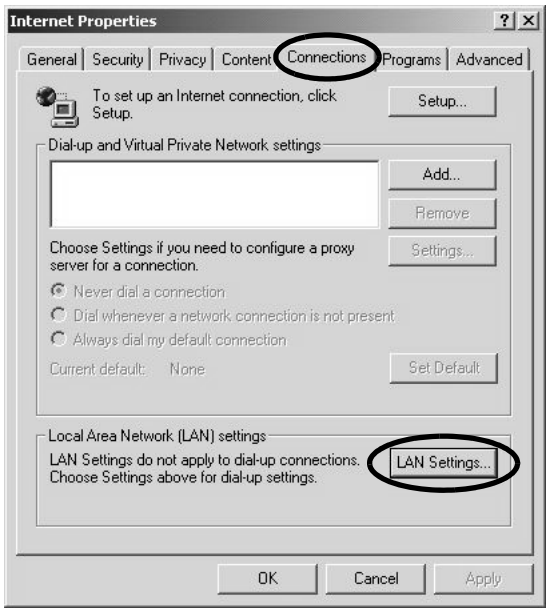
Prior to make settings for Ethernet connection, the IP address of the personal computer must be set. Set the IP address using the following procedure.

- Make the following settings with the LAN cable connected.

1. Click the Windows **Start** button and select ***Settings*** - ***Control Panel*** - ***Internet Options***.

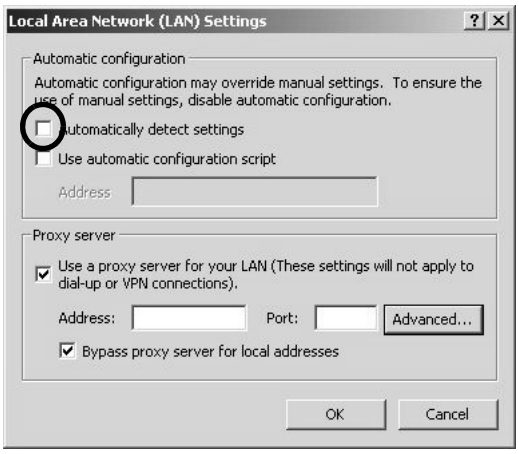
The **Internet Properties** dialog box will be displayed.

2. Click the **Connections** tab to display the tab page. Click the **LAN Settings...** button.



The **Local Area Network (LAN) Settings** dialog box will be displayed.

3. Check that the **Automatically detect settings** checkbox is cleared, and click the **OK** button to close the dialog box.

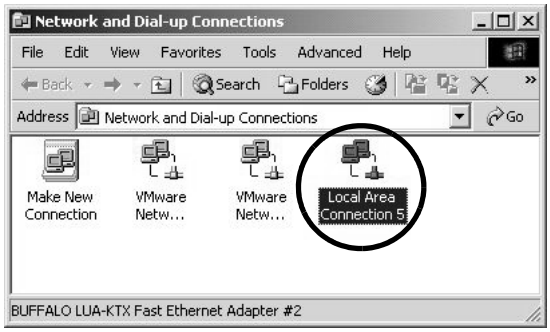

Local Area Network (LAN) Settings
Automatic configuration
Automatic configuration may override manual settings. To ensure the use of manual settings, disable automatic configuration.
Automatically detect settings
Use automatic configuration script
Address
Proxy server
Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections).
Address:
Port:
Advanced...
Bypass proxy server for local addresses
OK
Cancel

4. For a computer running the Windows 2000 OS, click the Windows **Start** button and select ***Settings*** - ***Control Panel*** - ***Network and Dial-up Connections***.
For a computer running the Windows XP OS, click the Windows **Start** button and select ***Settings*** - ***Control Panel*** - ***Network Connections***.

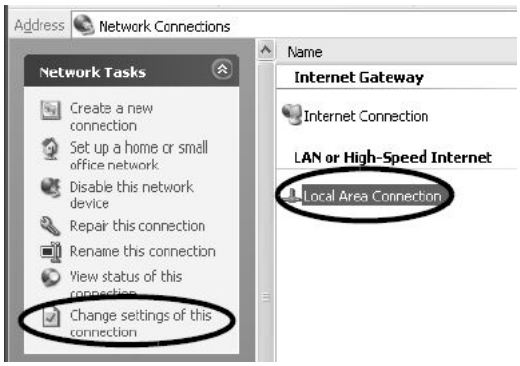
On a computer running the Windows 2000 OS, the **Network and Dial-up Connections** window will be displayed. On a computer running the Windows XP OS, the **Network Connections** window will be displayed.

5. On a computer running the Windows 2000 OS, double-click the **Local Area Connection** icon.
On a computer running the Windows XP OS, click **Local Area Connection** and click **Change settings of this connection** in the **Network Tasks** field.

Windows 2000

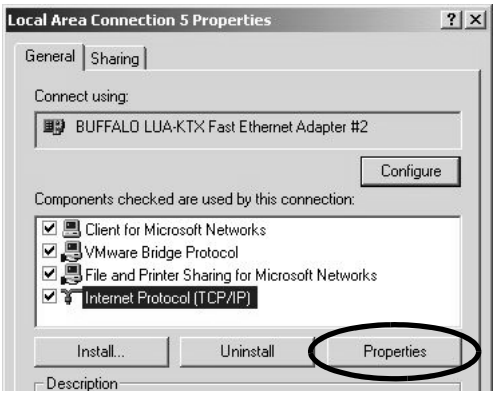


Windows XP



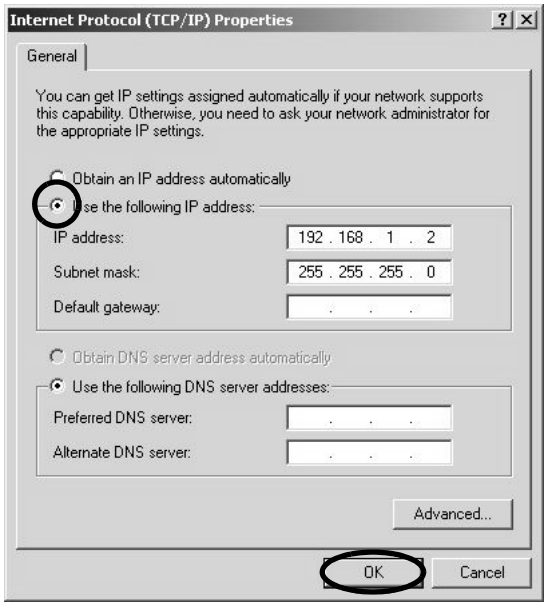
The **Local Area Connection Properties** dialog box will be displayed.

6. Select **Internet Protocol (TCP/IP)** and click the **Properties** button.



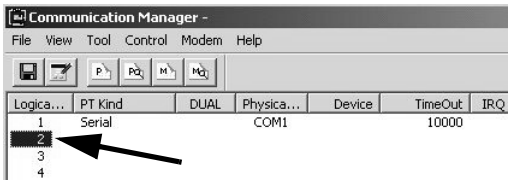
The **Internet Protocol (TCP/IP) Properties** dialog box will be displayed.

7. Click the **Use the following IP address** option and enter 192 168 1 2 for **IP address** and 255 255 255 0 for **Subnet mask**. Then click the **OK** button to close the dialog box.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 2
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

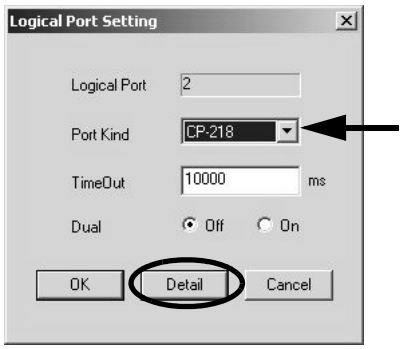
[c] Setting the Ethernet Communication Port

1. Double-click Logical Port No. **2** in the **Communication Manager** window to display the **Logical Port Setting** dialog box.



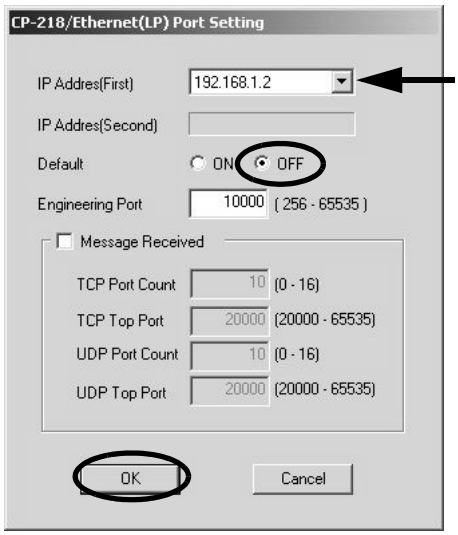
2. Select **Ethernet** or **CP-218** under **Port Kind** in the **Logical Port Setting** dialog box and click the **Detail** button.

- **Ethernet** and **CP-218** set the same communication specifications. Either can be set for Ethernet communications.

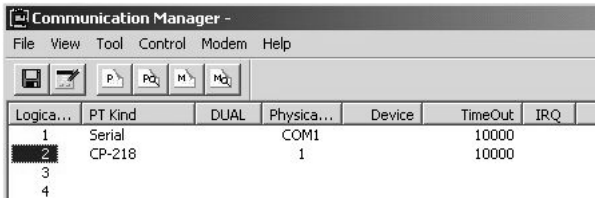


The **CP-218/Ethernet (LP) Port Setting** dialog box will be displayed.

3. Enter the IP address of the computer and click **OFF** for **Default**. Leave the other items on their default settings. Click the **OK** button to close the dialog box.


CP-218/Ethernet(LP) Port Setting
IP Addres(First) 192.168.1.2
IP Addres(Second)
Default ON OFF
Engineering Port 10000 (256 - 65535)
Message Received
TCP Port Count 10 (0 - 16)
TCP Top Port 20000 (20000 - 65535)
UDP Port Count 10 (0 - 16)
UDP Top Port 20000 (20000 - 65535)
OK Cancel

4. The **Logical Port Setting** dialog box will be displayed again. Click the **OK** button to return to the **Communication Manager** window. Check that **CP-218** (Ethernet connection) is assigned to Logical Port No. **2**.



5. Save the settings and restart the Communication Manager.

Refer to ■*Saving the Communication Port Settings and Restarting the Communication Manager* for the procedure.

(3) Setting the Ethernet (LP) Communication Port

These are the optimum settings to perform engineering via the Ethernet communication port of the 218IF-02 Module. For Ethernet connection, a general-purpose Ethernet board or PCMCIA Ethernet card must be mounted on the personal computer. Prior to make settings, the IP address of the personal computer must be set.
The Ethernet (LP) communication port can be connected to the 218IFB function of the 218IF-02 Module. It has a larger engineering message size in comparison to previous Ethernet communication ports, enabling high-speed engineering communication.
The port type and Modules that can be used together are given in the following table.

Port Type	Module	
	218IF-01 (218IF)	218IF-02 (218IFB)
CP-218	○	○
Ethernet	○	○
Ethernet (LP)	×	○

[a] Mounting an Ethernet Card

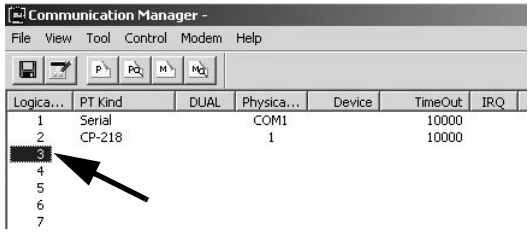
Mount a general-purpose Ethernet board or PCMCIA Ethernet card on the specified connector of the personal computer. Also, install the driver provided with the Ethernet card.

[b] Setting the IP Address

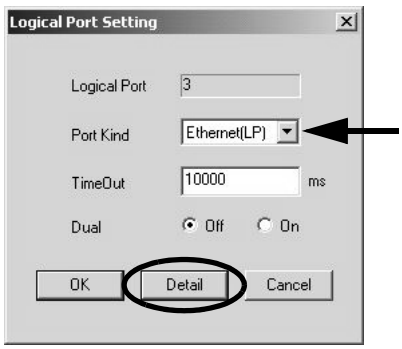
Set the IP address of the personal computer using the procedure given in *3.3.2 (2) [b] Setting the IP Address*.

[c] Setting the Ethernet (LP) Communication Port

1. Double-click Logical Port No. **3** in the **Communication Manager** window to display the **Logical Port Setting** dialog box.

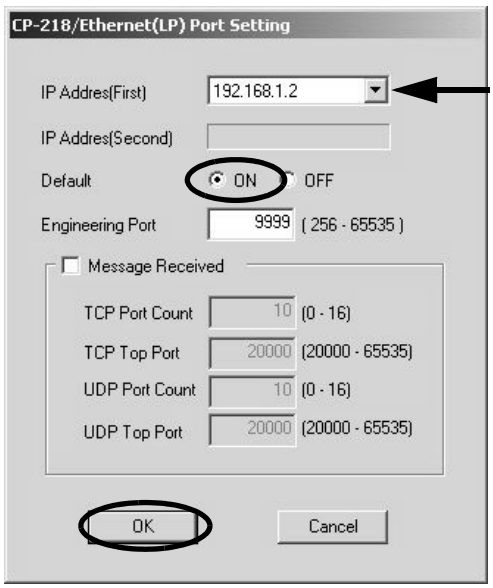


2. Select **Ethernet (LP)** under **Port Kind** in the **Logical Port Setting** dialog box and click the **Detail** button.

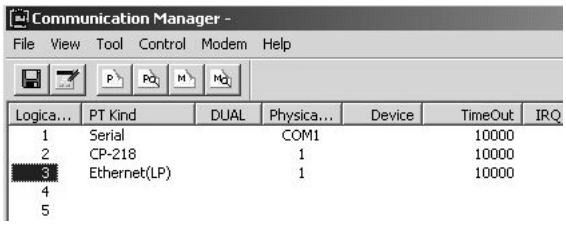


The **CP-218/Ethernet (LP) Port Setting** dialog box will be displayed.

3. Enter the IP address of the computer for the **IP Address (First)**, make sure the rest of the settings are as shown below, and click the **OK** button to close the dialog box.



4. The **Logical Port Setting** dialog box will be displayed again. Click the **OK** button to return to the **Communication Manager** window. Check that **Ethernet (LP)** is assigned to Logical Port No. **3**.



5. Save the settings and restart the Communication Manager.

Refer to ■ *Saving the Communication Port Settings and Restarting the Communication Manager* for the procedure.

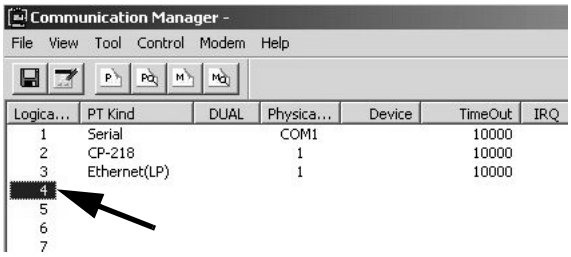
(4) Setting the CP-215 Communication Port

These settings are required to perform engineering via the CP-215 communication port of the 215AIF-01 Module.

- A CP-215PC/AT card must be mounted on the personal computer and set for the CP-215 connection. Contact your Yaskawa representative for more information.

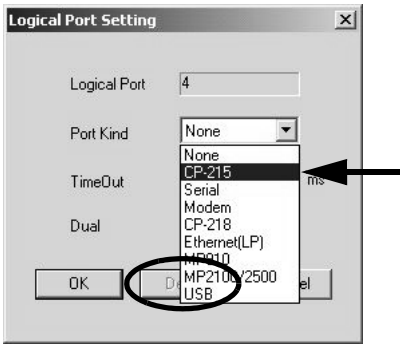
[a] Setting the CP-215 Communication Port

1. Double-click Logical Port No. **4** in the **Communication Manager** window.



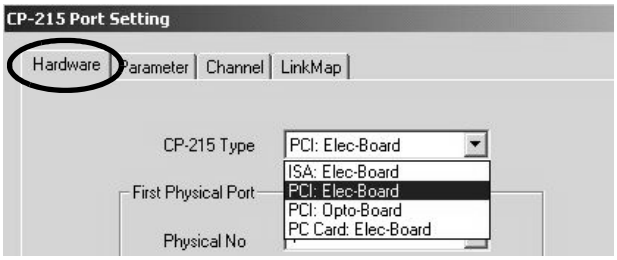
The **Logical Port Setting** dialog box will be displayed.

2. Select **CP-215** under **Port Kind** in the **Logical Port Setting** dialog box and click the **Detail** button.

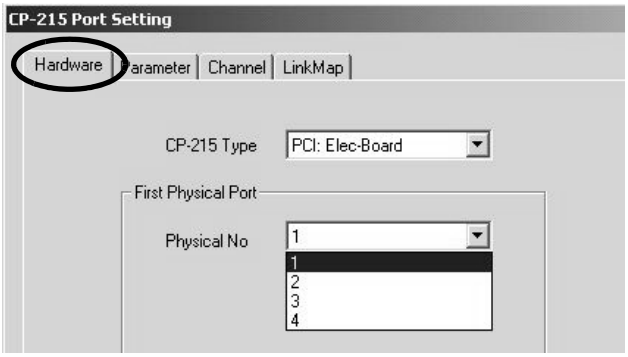


The **CP-215 Port Setting** dialog box will be displayed.

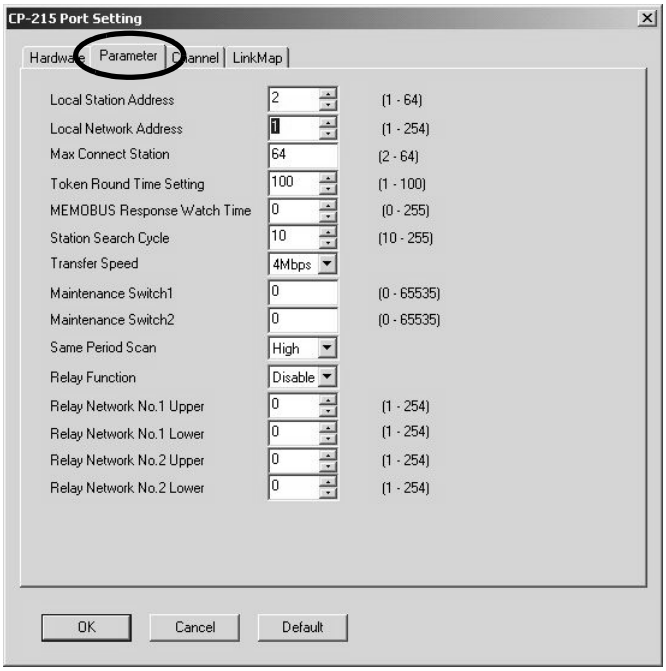
3. The **Hardware** tab page will be displayed. Select the type of CP-215PC/AT card mounted on the personal computer under **CP-215 Type**.



4. Set the I/O port number of the mounted CP-215PC/AT card under **Physical No**. Set the I/O port number to 1 when using one CP-215PC/AT card. When using two or more cards, allocate ports 2, 3, and 4 sequentially.



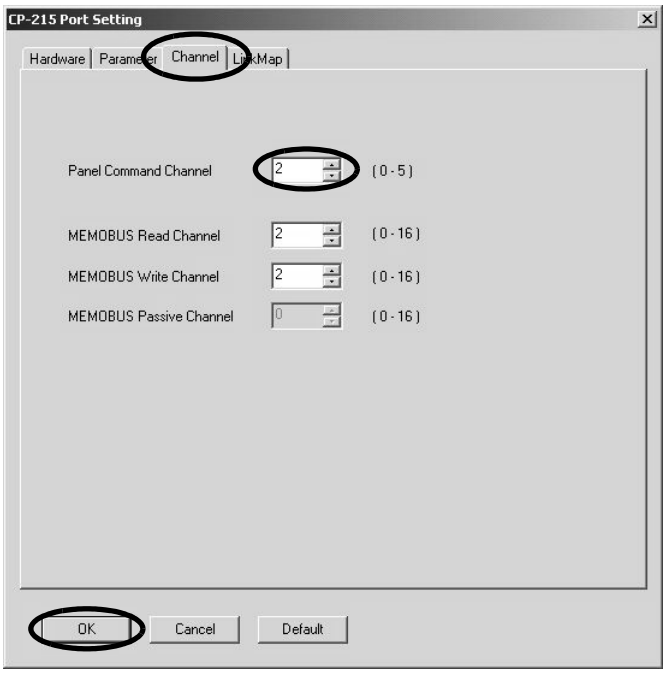
5. Click the **Parameter** tab in the **CP-215 Port Setting** dialog box. Set the following items.



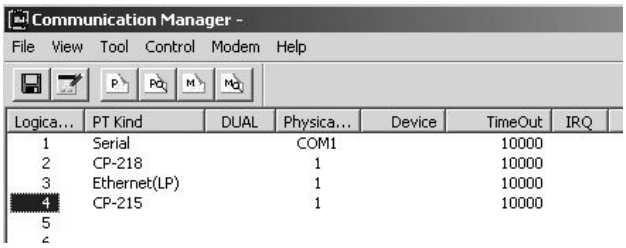
Local Station Address	:	Set the MPE720 (personal computer) station number to between 1 and 64.
Local Network Address	:	Set the number of the network to which the MPE720 (personal computer) is connected to between 1 and 254. If there is only one network segment, set 1.
Max Connect Station	:	Set the number of CP-215 network stations.
Token Round Time Setting	:	This is the target time from when each station receives the token until the next time the same station receives the token. Set **100**.
MEMOBUS Response Watch Time	:	This is the time from when a message is sent until the response is received. Set **255**.

Leave the other items set to their default values.

6. Click the **Channel** tab in the **CP-215 Port Setting** dialog box. Select **2** under **Panel Command Channel**. Leave the other items set to their default values and click the **OK** button to close the dialog box.



7. The **Logical Port Setting** dialog box will be displayed again. Click the **OK** button to return to the **Communication Manager** window. Check that **CP-215** (MPLINK/CP-215 connection) is assigned to the Logical Port No. **4**.


Communication Manager -
File View Tool Control Modem Help
Logica... PT Kind DUAL Physica... Device TimeOut IRQ
1 Serial COM1 10000
2 CP-218 1 10000
3 Ethernet(LP) 1 10000
4 CP-215 1 10000
5

8. Save the settings and restart the Communication Manager.

Refer to ■*Saving the Communication Port Settings and Restarting the Communication Manager* for the procedure.

3.4 Self-configuration

The self-configuration function automatically detects the Option Modules connected to the Machine Controller and automatically generates the files for the Module configuration definitions and the detailed definition of each Module. Executing self-configuration will greatly reduce the system startup procedure.

- After executing self-configuration, always save data to flash memory so that the results of self-configuration are saved to the Machine Controller.

3.4.1 Executing Self-configuration

The methods used to execute self-configuration are described below.

(1) Setting the CNFG DIP Switch Pin and Turning the Power ON (MP2200/MP2300/MP2310/MP2300S)

Self-configuration can be executed by turning ON the CNFG DIP switch pin on the Machine Controller and then turning the power ON. The result will depend on the setting of the INIT DIP switch pin.

CNFG	INIT	Result
ON	ON	• The Module configuration definitions are updated. • The default values are allocated in the definitions for all of the Modules that are detected.
ON	OFF	• The Module configuration definitions are updated. • The definitions for any Modules for which definitions already exist are not changed. • The default values are allocated in the definitions for any new Modules that are detected.

- The DIP switch is not normally used for the MP2100M/MP2500MD. For these Machine Controllers, execute self-configuration by following the procedure described in *(2) Using the MPE720 (MP2100M/MP2500MD)* below.

(2) Using the MPE720 (MP2100M/MP2500MD)

After starting the MPE720, start the Engineering Manager, and then select ***Order - Self Configure All Modules*** from the main menu in the **Module Configuration** window. Alternatively, select the Module for which self-configuration is to be executed in the **Module Configuration** window, and then select ***Order - Module Self-configuration*** from the main menu.

- Refer to *4.1.1 Displaying the Module Configuration Window* for the procedure to display the **Module Configuration** window.

The result depends on the command that is used, as described below.

Command	Result
Self-configuration for all Modules	• The Module configuration definitions are updated. • The definitions for any Modules for which definitions already exist are not changed. • The default values are allocated in the definitions for any new Modules that are detected.
Module Self-configuration	• Definitions are allocated only for the selected Module. • The definitions for any Modules for which definitions already exist are not changed. • The default values are allocated in the definitions for any new Modules that are detected.

3.5 Starting the MPE720 and Setting Communication or Network Parameters

This section describes how to start the MPE720 and set the communication parameters in the object file (MPE720 Ver. 6) or the network parameters in the PLC folder (MPE720 Ver.5.□□).

3.5.1 Starting MPE720 Ver. 6 and Setting Communication

This section describes how to start the MPE720 Ver. 6 and set the communication parameters in the object file.

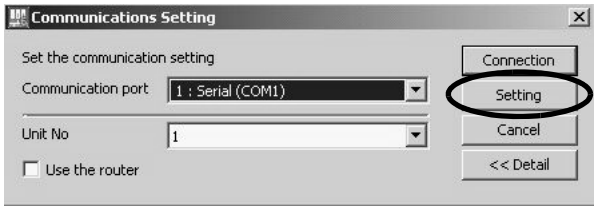
- Disconnect the Machine Controller when setting the parameters.
- Create the object file in advance.

1. Select ***Online - Communications Setting*** from the main menu. Alternatively, select ***Controller - Communications Setting*** (or ***Project - Communications Setting***) in the Start window.

The **Communications Setting** dialog box will be displayed.

2. Select the logical port number to use to connect the Machine Controller and click the **Setting** button.

- Settings for the logical port numbers are made with the Communication Manager. Refer to *3.3 Setting the Communication Manager* for the Communication Manager setting procedure.



Communication will be set and the dialog box will close.

- The **Connection** and **Setting** buttons will be disabled while the Machine Controller is connected.

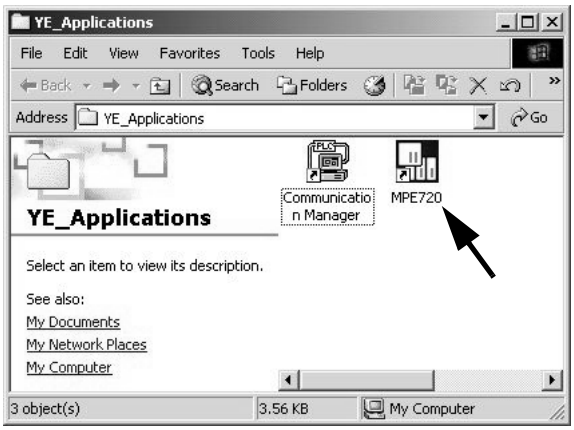
3.5.2 Starting MPE720 Ver. 5. □□ and Setting the Network

This section describes how to start the MPE720 and set the network parameters in the PLC folder.

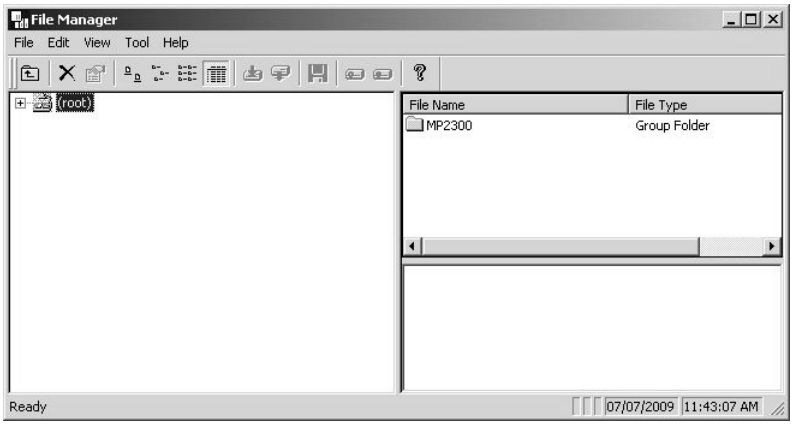
- Create the PLC folder in advance.

1. Open the **YE_Applications** folder and double-click the **MPE720** icon.
Alternatively, select ***MPE720*** from the **Start** menu.

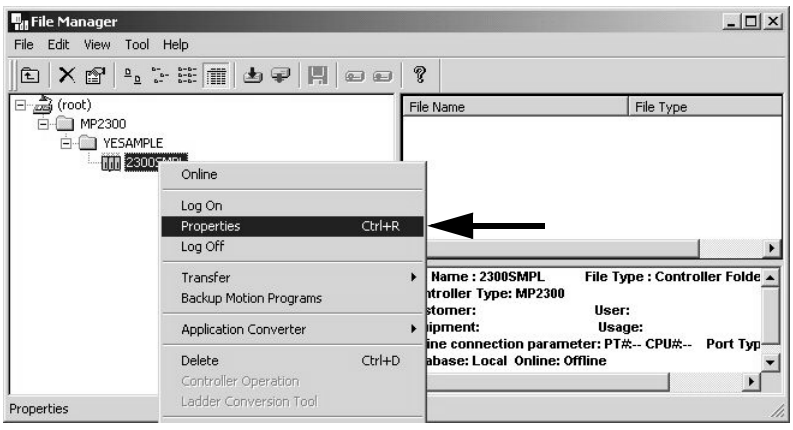
- The procedure to select the network depends on the operating system.



The MPE720 will start and the **File Manager** window will be displayed.

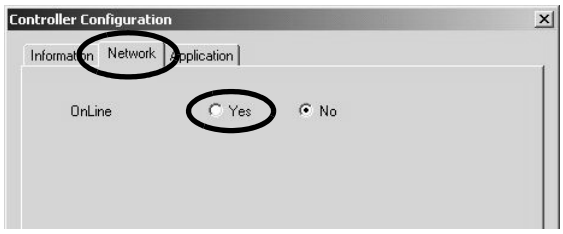


2. Open the root, group, and then order folder, right-click the desired PLC folder, and select ***Properties*** from the pop-up menu that is displayed.



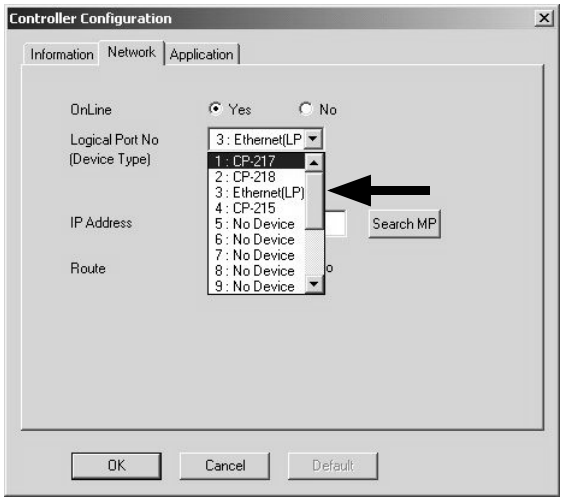
The **Controller Configuration** dialog box will be displayed.

3. Click the **Network** tab and select **Yes** for **OnLine**.



Fields will be displayed for the logical port number, unit number, and route so that they can be set.

4. For **Logical Port No. (Device Type)**, set the logical port number to use from the logical port numbers that were set with the Communication Manager.

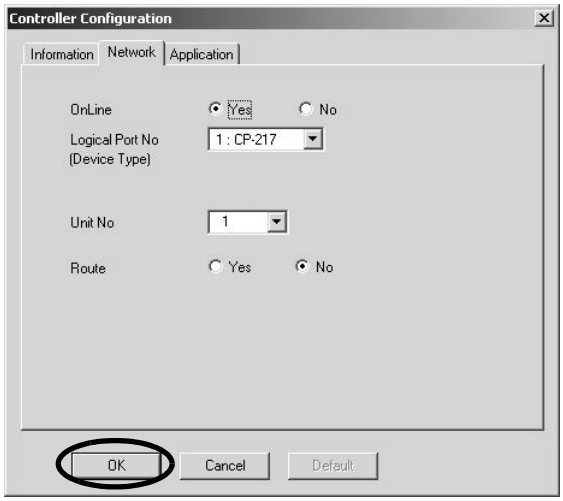


The contents display on the tab page may change depending on the port that is selected.

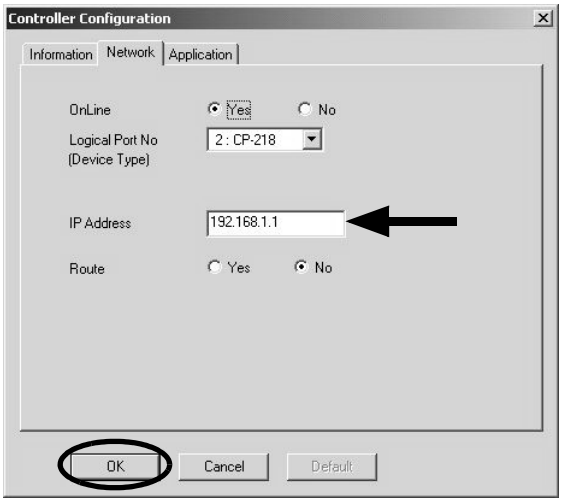
- The devices types indicate the following connections: CP-217 indicates an RS-232C connection (serial port), CP-218 indicates an Ethernet connection, and CP-215 indicates a connection through a CP-215PC/AT card mounted on the personal computer.

5. <RS-232C Connection>

Leave all other settings other than for **Logical Port No. (Device Type)** on their default values and click the **OK** button.

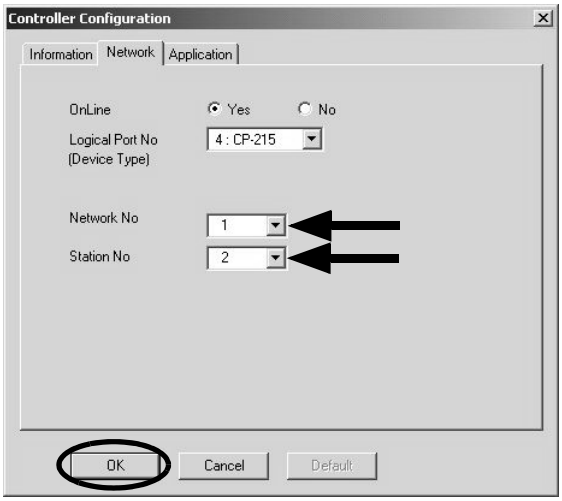


<Ethernet Connection>
Enter the IP address of the personal computer and click the **OK** button.

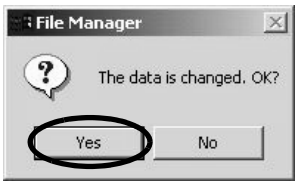


<CP-215 Connection>
Enter the network number and station number and click the **OK** button.

- Enter the same network number and station number as the ones set with the Communication Manager.



6. A confirmation dialog box will be displayed. Click the **Yes** button. This completes selecting the logical port.



The transmission definition settings are required for each Communication Module. Refer to Machine Controller MP2000 Series Communication Module User's Manual (Manual No.: SIEPC88070004) for details on the transmission definition settings.

3.6 Displaying a Register List and Notes at Register Input

3.6.1 Displaying a Register List

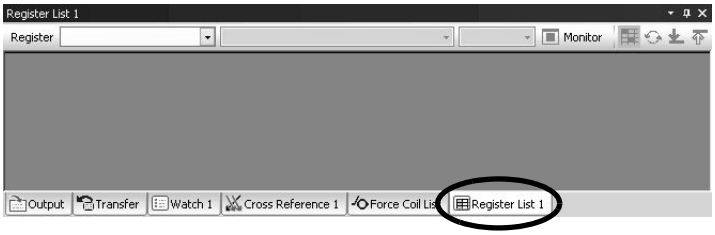
If viewing the I/O data (IW registers and OW registers) with the MPE720, use the register list.
The following describes how to display the register list and notes during register input.

(1) MPE720 Ver 6.□□

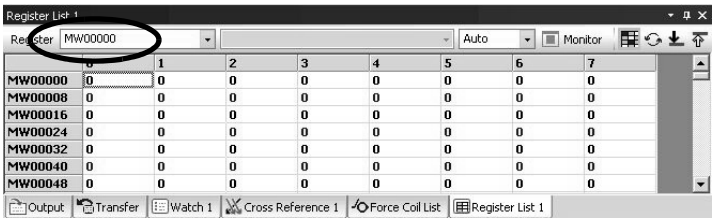
Use the following procedure to display the MPE720 Ver 6.□□ register list.

1. Open the **Register List** sub-window from the **MPE720 Ver 6.□□** main window.

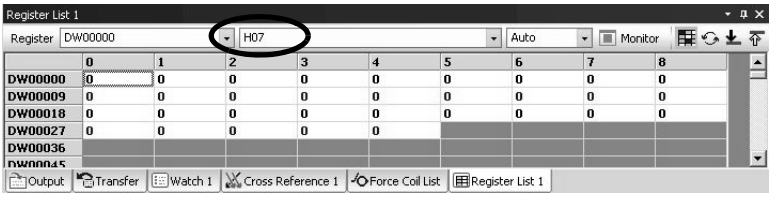
The **Register List 1** tab is provided by default in the sub-window displayed on the bottom of the screen.



2. Enter the leading register number of the system register “MWxxxxx” (or “DWxxxxx”) to be accessed in the **Register** input field and press the **ENTER** key. The contents of the system register will be displayed starting from the leading register number.



- Enter the drawing number for the D register as follows.

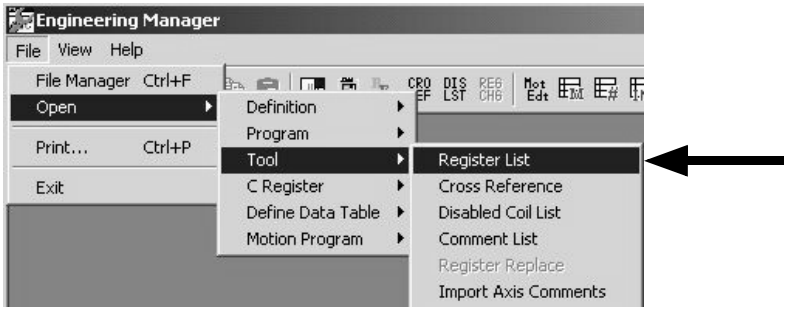


- The data type is set by default to decimal. Place the cursor anywhere in the list, and then right-click. Select ***Hex*** (hexadecimal) from the pop-up menu that appears. The data will then be displayed in hexadecimal.

(2) MPE720 Ver 5.□□

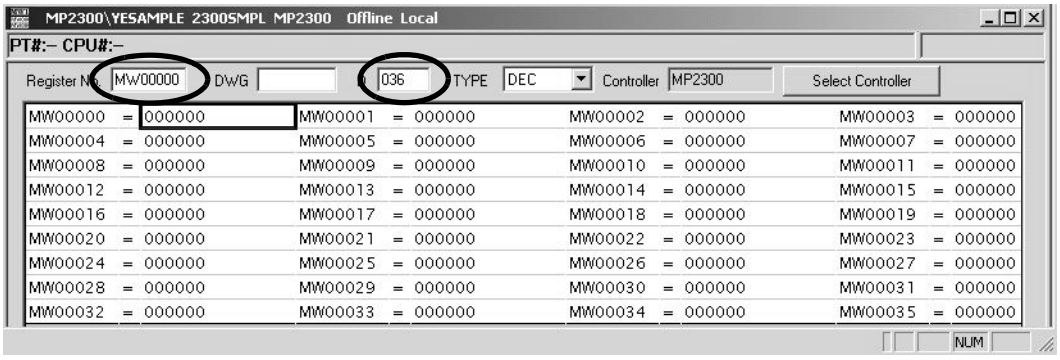
Use the following procedure to display the MPE720 Ver 5.□□ register list.

1. Select ***File*** – ***Open*** – ***Tool*** – ***Register List*** from the MPE720 Ver 5.□□ main menu of the **Engineering Manager** window to open the **Register List** window.



- Refer to *4.1.1 Displaying the Module Configuration Window* for details on how to display the **Engineering Manager** window.

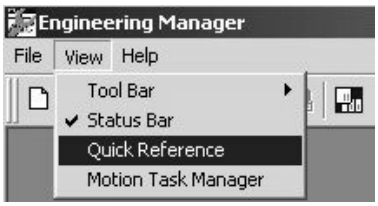
2. Enter the leading register number “MWxxxxx” (or “DWxxxxx”) to be accessed in the **Register No.** input field, enter the final register number to be accessed in the **D** input field, and click anywhere in the list. The contents of the specified range of register numbers will be displayed.



(3) Displaying a Register List with the Quick Reference (MPE720 Ver 5.□□)

Register lists can also be accessed with the Quick Reference.

1. Select ***View*** – ***Quick Reference*** from the main menu of the MPE720 **Engineering Manager** window.

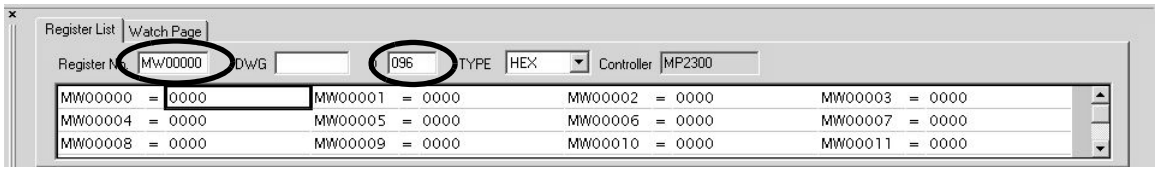


The Quick Reference will be displayed at the bottom of the **Engineering Manager** window.

- Refer to *4.1.1 Displaying the Module Configuration Window* for details on how to display the **Engineering Manager** window.

2. Click the **Register List** tab to switch to the register list.

3. Enter the leading register number “MWxxxxx” to be accessed in the **Register No**. input field, enter the number of registers to be accessed in the **D** input field, and click anywhere in the list. The contents of the specified range of register numbers will be displayed.



3.6.2 Notes at Register Input

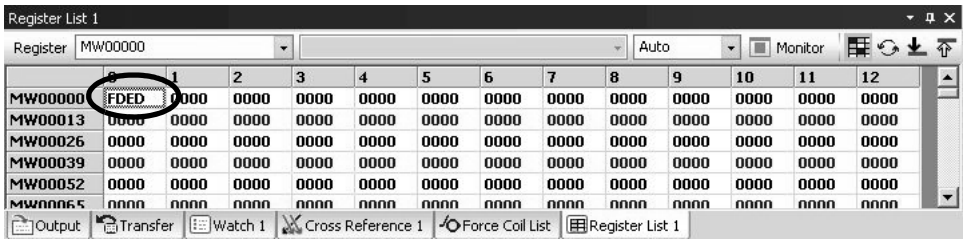
(1) Decimal/Hexadecimal Number

DW and MW registers are signed integer registers, and their input ranges in decimal notation are from −32768 to +32767. (Hexadecimal: 0 to FFFFH)
Because integers greater than or equal to +32768 cannot be input to these registers as decimal numbers, set the display mode to “HEX” (hexadecimal) and input them in hexadecimal notation for entry of a remote address or transaction code.

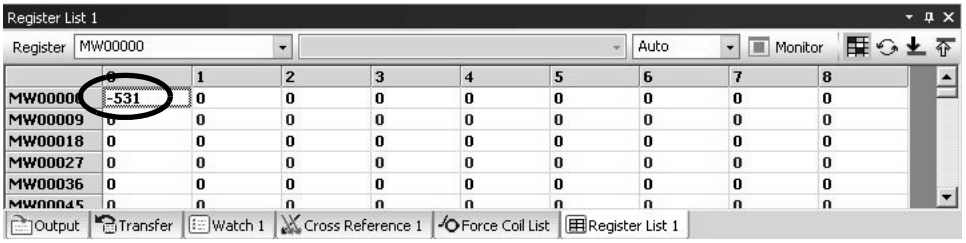
(2) Negative Value Representation in Decimal Numbers

When a register input with a hexadecimal value is displayed as a decimal number, its value may be represented as a negative value as shown below.

Hexadecimal



Decimal


Register List 1
Register MW00000
Auto
Monitor
MW00000 -531 0 0 0 0 0 0 0 0
MW00009 0 0 0 0 0 0 0 0 0
MW00018 0 0 0 0 0 0 0 0 0
MW00027 0 0 0 0 0 0 0 0 0
MW00036 0 0 0 0 0 0 0 0 0
Output
Transfer
Watch 1
Cross Reference 1
Force Coil List
Register List 1

This is because a hexadecimal input value is greater than +32768 (decimal number) and it is represented as a negative value through bit inversion. In spite of negative value representation, processing is performed as a positive value.
To convert a negative decimal number into a positive decimal number, the following expression is used.

| –32768 | + 32767 + 1 + (displayed negative value)

In the above screen example (−531), the following is used.

| –32768 | + 32767 + 1 + (–531) = 65005

4

EtherCAT Transmission Definition

To perform EtherCAT communication with the 264IF-01 Module using an MP2000 Series Machine Controller, an EtherCAT transmission definition file must be created. This chapter describes how to set the EtherCAT transmission definition on the MPE720 screen.

4.1 Displaying the EtherCAT Transmission Configuration Window ----------4-2

4.1.1 Displaying the Module Configuration Window ---------- 4-2

4.1.2 Displaying the EtherCAT Transmission Configuration Window from the Module Configuration Window ---------- 4-4

4.2 EtherCAT Transmission Definition ----------4-5

4.2.1 Transmission Parameters Tab Page ---------- 4-5

4.2.2 Status Tab Page ---------- 4-7

4.1 Displaying the EtherCAT Transmission Configuration Window

This section describes how to open the **Module Configuration** window from the MPE720, open the **EtherCAT Transmission Configuration** window from the **Module Configuration** window, and set the transmission definition for the EtherCAT Module.

4.1.1 Displaying the Module Configuration Window

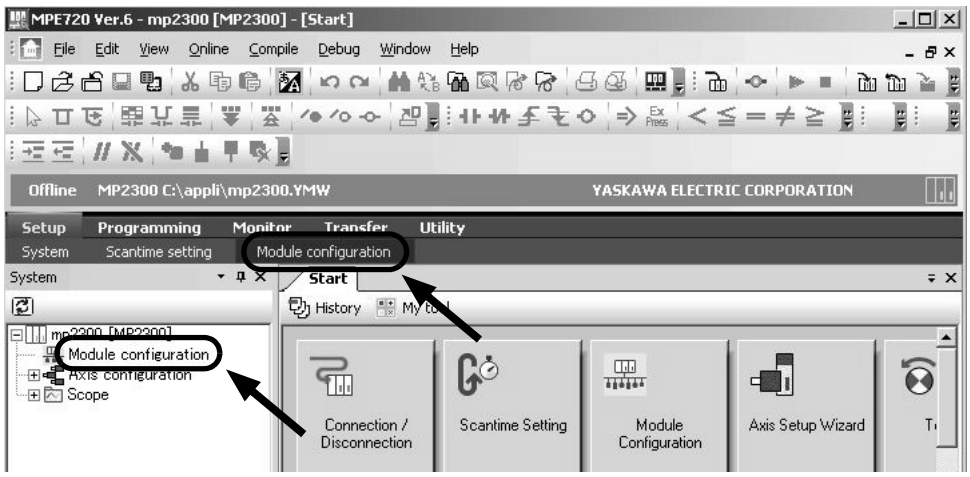
Use the following procedure to display the **Module Configuration** window.

(1) MPE720 Ver. 6

1. Start the MPE720 on the personal computer connected to the Machine Controller, and open the project file.

- For information on starting the MPE720, refer to *Machine Controller MPE720 Programming Device Ver. 6 User's Manual (Manual No.: SIEPC88070030)*.

2. Select ***Setup - Module configuration*** in the Launcher, or double-click the **Module configuration** icon in the system subprogram.



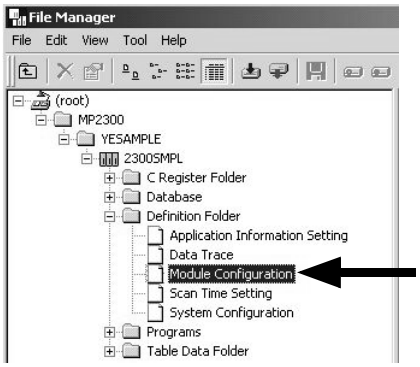
The Engineering Manager will launch and the **Module Configuration** window will open (refer to 4.1.2).

(2) MPE720 Ver. 5

1. Start the MPE720 on the personal computer connected to the Machine Controller and use the File Manager to log in and go online with the application for the Machine Controller.

- For information on starting the MPE720 and logging on, refer to *MPE720 Software for Programming Device User's Manual (Manual No.: SIEPC88070005)*.

2. Double-click the **Module Configuration** icon in the **Definition Folder**.

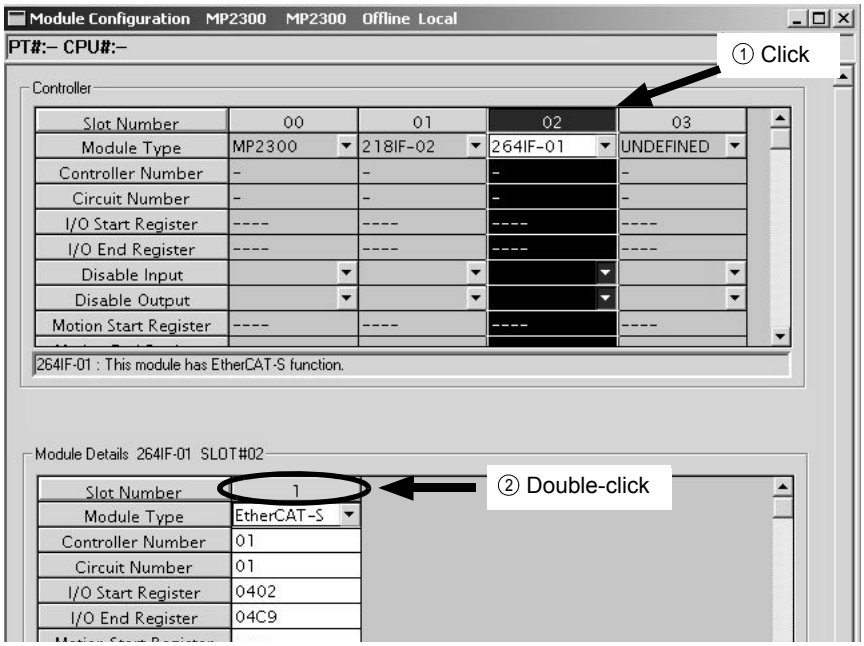


The Engineering Manager will launch and the **Module Configuration** window will open (refer to 4.1.2).

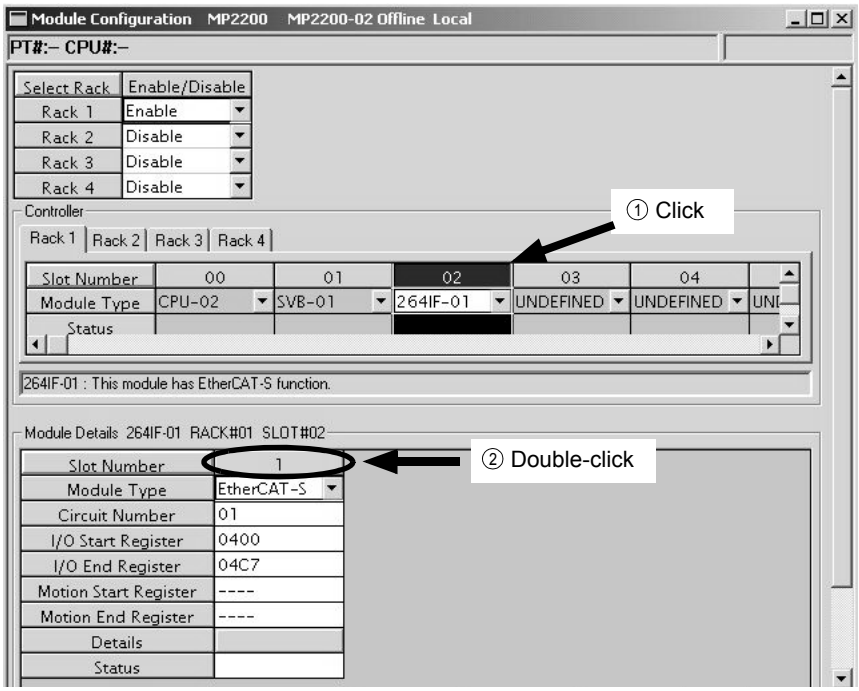
4.1.2 Displaying the EtherCAT Transmission Configuration Window from the Module Configuration Window

As the result of executing self-configuration, all Option Modules connected to the Machine Controller will be displayed in the **Controller** area of the **Module Configuration** window. (Refer to *3.4.1 Executing Self-configuration*.)

<MP2300/MP2310/MP2300S Module Configuration Window>



<MP2100M, MP2200, or MP2500MD Module Configuration Window>



In the **Controller** area, select the 264IF-01 cell and then double-click the slot number cell of EtherCAT in the **Module Details** area. The **EtherCAT Transmission Configuration** window (refer to the next page) will then open.

- If the **Transmission Configuration** window is being opened for the first time, a "new file" message box will be displayed and the **EtherCAT Transmission Configuration** window will open when the **OK** button is clicked.

In Online Mode, the EtherCAT transmission definition data saved in the Machine Controller is displayed. In Offline Mode, the EtherCAT transmission definition data saved in the personal computer on which MPE720 is running is displayed.

Refer to *4.2 EtherCAT Transmission Definition* to perform EtherCAT transmission definition settings.

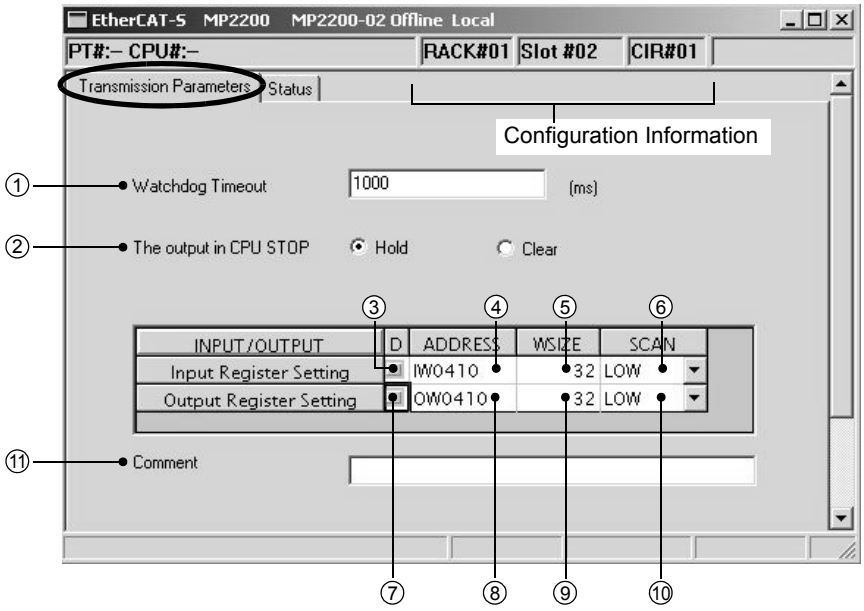
4.2 EtherCAT Transmission Definition

The **EtherCAT Transmission Configuration** window has two tab pages, namely Transmission Parameters and Status. Select the appropriate tab page to perform setting and monitoring.

4.2.1 Transmission Parameters Tab Page

On the Transmission Parameters tab page, set the network parameters required to perform EtherCAT communication. The following explains the details of the network parameter setting.

- After changing the setting on the Transmission Parameters tab page, save the definition data by selecting ***File - Save to Flash*** from the main menu.



■ Configuration Information

Displays the 264IF-01 Module configuration information. The configuration information is the same as the information displayed in the **Module Details** area in the **Module Configuration** window.

RACK#: The rack number of the rack in which the 264IF-01 Module is defined.
Slot#: The slot number of the slot in which the 264IF-01 Module is defined.
CIR#: The circuit number of the EtherCAT port on the 264IF-01 Module.

■ Parameters

① Watchdog Timeout

Set the monitoring time for detecting an error in EtherCAT communication.
The setting range is 0 to 65535. (This setting is for future use. Making a setting has no effect.)

② The output in CPU STOP

Set the status of the output data when the STOP status has been set at the controller CPU.
If **Hold** is set, the last data before the STOP status is output. If **Clear** is set, 0 data is output.

■ Input Register Setting

③ D

Set whether or not the controller CPU exchanges input data with EtherCAT.
When the checkbox is checked, there is no exchange of data.

④ ADDRESS

Set, as a hexadecimal word, the initial address of the input area of the controller CPU for the output data of the EtherCAT master device. The setting range is 0 to 7FFF.

⑤ WSIZE

Set the same size as the output data size of the EtherCAT master device in word units. The setting range is 0 to 199*.

⑥ SCAN

Set the timing in which the controller CPU exchanges cyclic data with EtherCAT.
The data exchange cycle of the controller CPU is asynchronous with cyclic communication. When **HIGH** is set, the controller CPU inputs cyclic data in the timing of the high-speed scan time of the CPU. When **LOW** is set, the controller CPU inputs cyclic data in the timing of the low-speed scan time of the CPU.

■ Output Register Setting

⑦ D

Set whether or not the controller CPU exchanges output data with EtherCAT. When the checkbox is checked, there is no exchange of data.

⑧ ADDRESS

Set, as a hexadecimal word, the initial address of the output area of the controller CPU for the input data of the EtherCAT master device. The setting range is 0 to 7FFF.

⑨ WSIZE

Set the same size as the input data size of the EtherCAT master device in word units. The setting range is 0 to 199*.

⑩ SCAN

Set the timing in which the controller CPU exchanges cyclic data with EtherCAT.
The data exchange cycle of the controller CPU is asynchronous with cyclic communication. When **HIGH** is set, the controller CPU outputs cyclic data in the timing of the high-speed scan time of the CPU. When **LOW** is set, the controller CPU outputs cyclic data in the timing of the low-speed scan time of the CPU.

■ Others

⑪ Comment

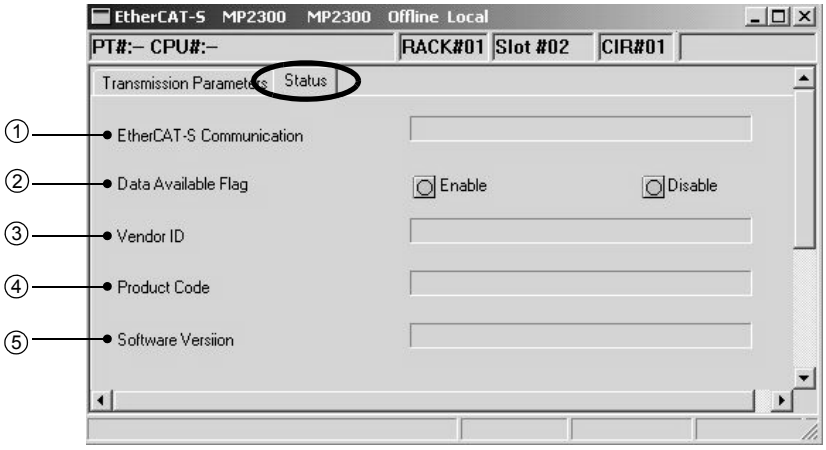
Set any name of your choice up to 32 single byte characters for the local station.

* Set WSIZE in the input register settings and output register settings so that it satisfies the following conditions.

Condition	WSIZE Setting
1. When 0 is included in either setting	Input WSIZE + output WSIZE ≤ 198 words
2. When either setting is an odd-number size	Input WSIZE + output WSIZE ≤ 199 words
Other than condition 1 or condition 2	Input WSIZE + output WSIZE ≤ 200 words

4.2.2 Status Tab Page

The **Status** tab page displays the status of the 264IF-01 Module.
On this tab page, setting is not possible.



(1) Details of the Status tab page

The following explains each item displayed on the **Status** tab page.

① EtherCAT-S Communication

Displays the status of EtherCAT.
The same information as shown by the NS status LED is shown here. The actual indications are as follows.
Non-INIT, INIT, PRE-OPERATIONAL, SAFE-OPERATIONAL, OPERATIONAL

② Data Available Flag

Displays the process data communication status after turning the power ON.
Enable: EtherCAT process data is communicated.
Disable: EtherCAT process data is not communicated.

- This is a flag that informs the user whether or not process data communication has started.
  It is not a flag that is enabled upon reception of any particular process data from the EtherCAT master device.
  To check the reception of any particular process data from the EtherCAT master device, make some provision in the application, for example providing a data refresh bit in the process data.

③ Vendor ID

Displays Yaskawa's (YaskawaE_JP) vendor ID.

④ Product Code

Displays the product code of the 264IF-01 Module.

⑤ Software Version

Displays the software version of the 264IF-01 Module.
For Ver 1.00, "1.00" is shown.

(2) Communication phases

The communication phases and their descriptions are listed below.

Status	Description
Non-INIT	This is the status when the power is turned ON, before EtherCAT has been initialized.
INIT	This is the EtherCAT initial status.
PRE-OPERATIONAL	This is the status that configuration is in progress for mailbox communication.
SAFE-OPERATIONAL	This is the status that configuration is completed. Mailbox communication is possible. The situation for process data communication is as follows. Input: Input is not possible. Output: 0 data is output.
OPERATIONAL	This is the normal communication status. Mailbox communication and process data communication is possible.

5

Operation Specifications of the Module

This chapter describes the operation specifications of the 264IF-01 Module.

5.1 Connection ----------5-2
5.1.1 Node Setting ---------- 5-2
5.1.2 Connection to an EtherCAT Network ---------- 5-4
5.2 Starting Method ----------5-5
5.2.1 Basic Sequence ---------- 5-5
5.2.2 Midstream Association ---------- 5-5
5.3 Process Data Communication (Cyclic Communication) ----------5-6
5.3.1 I/O Mapping ---------- 5-6
5.3.2 Data Refresh Timing ---------- 5-7
5.3.3 Data Synchronization ---------- 5-7
5.3.4 Data Refreshing at CPU STOP ---------- 5-8
5.4 Mailbox Communication (Message Communication) ----------5-8
5.4.1 System Messages ---------- 5-8
5.4.2 User Messages ---------- 5-8

5.1 Connection

5.1.1 Node Setting

For the 264IF-01 Module that is a slave device in EtherCAT systems, the communication parameter settings and I/O data allocations are made using an MPE720 connected to an MP2000 Series Machine Controller CPU.
For the EtherCAT master device, the device description files provided by the vendors of each of the slave devices are installed, and the slave node information is configured using a configuration tool (for example TwinCAT made by Beckhoff Inc.).
If there is a mismatch between the configuration information of the slave set at the master node and the slave node information of the 264IF-01 Module, the 264IF-01 Module is not recognized by the master node and a communication error occurs.

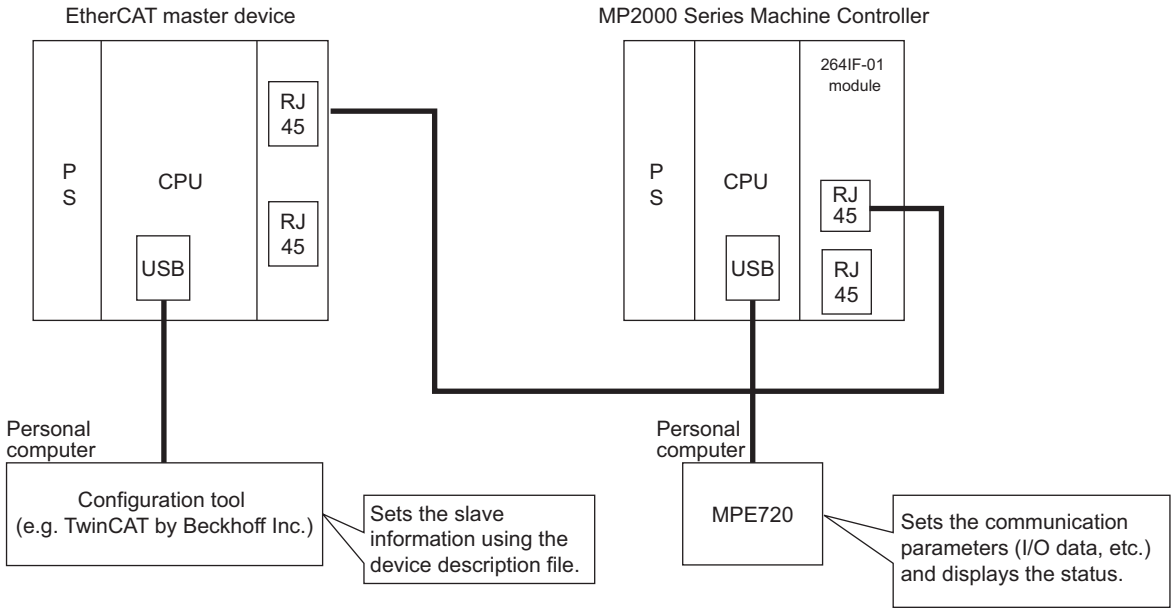


Fig. 5.1 Node Setting

(1) Device Description File

The device description file of the 264IF-01 Module is found in the installation disk of the Programming Device Software MPE720. The following four patterns of allocation are provided in the device description files of the 264IF-01 Module.

- Allocation of 32 input words and 32 output words
  File name: Yaskawa MP2000 In32-Out32 V1.00.xml
- Allocation of 100 input words and 100 output words (maximum equal allocation for input/output)
  File name: Yaskawa MP2000 In100-Out100 V1.00.xml
- Allocation of 2 input words and 198 output words (maximum output allocation)
  File name: Yaskawa MP2000 In2-Out198 V1.00.xml
- Allocation of 198 input words and 2 output words (maximum input allocation)
  File name: Yaskawa MP2000 In198-Out2 V1.00.xml

The user can use the module with the input/output sizes in the device description files customized. For details on the method for customization, see *Appendix C Device Description File*.

(2) Relationship between Master and Slave Allocations

Set the allocation size at the master side (the allocation size in the device description file) and the allocation size at the slave side (the [input size, output size] parameter setting of the 264IF-01 Module) so that they match. If there is a mismatch, communication may not be possible depending on the conditions.
The conditions for the allocation size at the master side and the slave side are indicated below.

Table 5.1 Conditions for the Allocation Size at the Master Side and the Slave Side

Condition	EtherCAT Communication	Description
Input (In) size in the device description file for the master side ≥ 264IF-01 parameter setting [Output size]	Possible	The input size of the device description file is secured in the EtherCAT transmission lines, but when refreshing data between the 264IF-01 Module and the MP2000 Series Machine Controller CPU, only the output size in the parameter settings is secured, and the input size is not secured.
Input (In) size in the device description file for the master side < 264IF-01 parameter setting [Output size]	Not possible	The EtherCAT communication status will not change to the OPERATIONAL status in which process data communication is possible.
Output (Out) size in the device description file for the master side ≥ 264IF-01 parameter setting [Input size]	Possible	The output size of the device description file is secured in the EtherCAT transmission lines, but when refreshing data between the 264IF-01 Module and the MP2000 Series Machine Controller CPU, only the input size in the parameter settings is secured, and the output size is not secured.
Output (Out) size in the device description file for the master side < 264IF-01 parameter setting [Input size]	Not possible	The EtherCAT communication status will not change to the OPERATIONAL status in which process data communication is possible.

5.1.2 Connection to an EtherCAT Network

(1) Connection Method

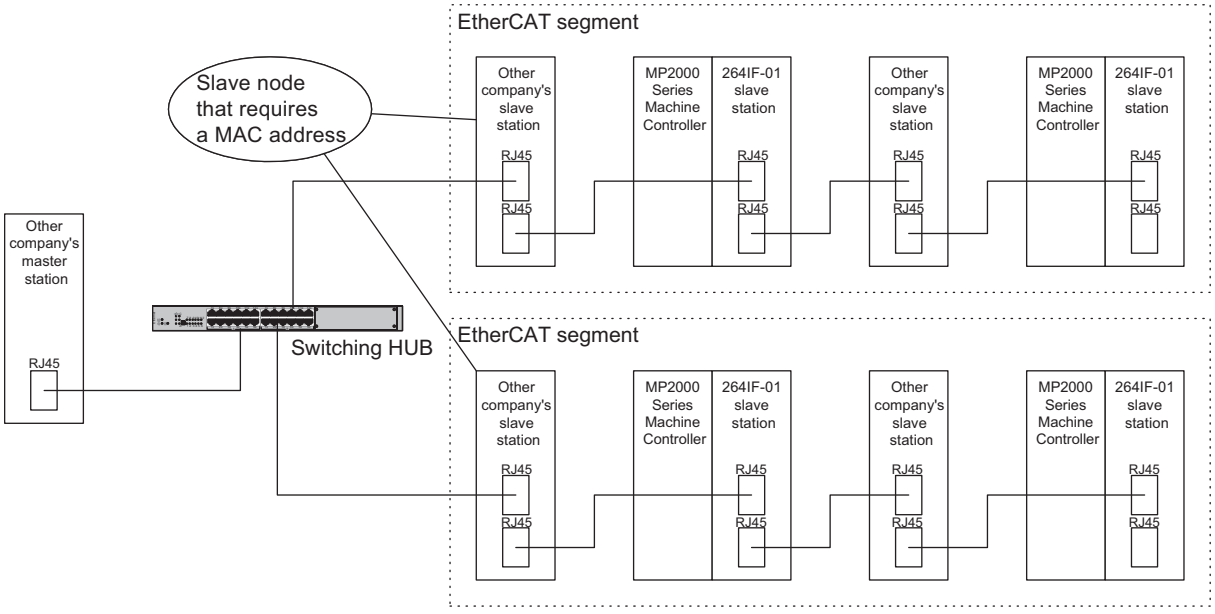
Connectors CN1 and CN2 of the 264IF-01 Module are on the same circuit in EtherCAT. Connect CN1 to the host side of the network that includes the EtherCAT master device, and connect CN2 to the subordinate side of a network that does not include the EtherCAT master device. If no slave device is connected at the subordinate side of the network, leave it open.

(2) About Topology

In EtherCAT networks any kind of connection is possible, with no specification of the mode of connection, but the connections before and after a 264IF-01 Module must be in the line connection mode.
However, when it is used in the open mode, since the 264IF-01 Module has no MAC address, it cannot be connected directly to a switching HUB. Where a slave node is to be directly connected to a HUB, connect a slave device that has a MAC address, then connect the 264IF-01 Module after this point.
Make the selection of open mode or direct mode at the EtherCAT master device.

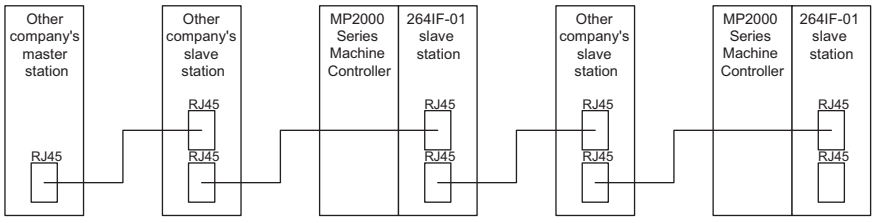
<Open Mode>

This is the mode in which a switching HUB is used in an EtherCAT network. Slave nodes that are connected directly to a HUB must have an Ethernet MAC address.



<Direct Mode>

This is the mode in which no switching HUB is used.



5.2 Starting Method

5.2.1 Basic Sequence

Start the devices or items in an EtherCAT network in the following order.

1. Master Node
2. Slave Nodes
3. Initialization Sequence Operation between the Master and Slave Nodes
4. Communications between Master and Slave Nodes

The data refresh start timing becomes effective at the point when the 264IF-01 Module's state machine becomes OPERATIONAL. From a ladder application, you can get to know that communication has started by viewing the system register.

5.2.2 Midstream Association

In the EtherCATnetwork, the master node controls the start sequence for each slave node. For this reason, midstream association of a 264IF-01 Module in an EtherCAT network in which communication is in progress is possible. However, it is necessary that a normal configuration has been set for the EtherCAT master device and the 264IF-01 Module.

5.3 Process Data Communication (Cyclic Communication)

5.3.1 I/O Mapping

This shows the mapping of the EtherCAT logic process data and the I/O registers of the MP2000 Series Machine Controller.

The EtherCAT logic process data space used by the 264IF-01 Module is decided in advance by configuration at the master node. The position within the Ethernet packets flowing in the network at which the I/O data of a 264IF-01 Module is positioned is automatically managed by the communication IC installed in the 264IF-01 Module. This means that, with the 264IF-01 Module, data can be refreshed just by setting the I/O size, without any awareness of the mapping (addresses of the data) of the logic process data of the master node.

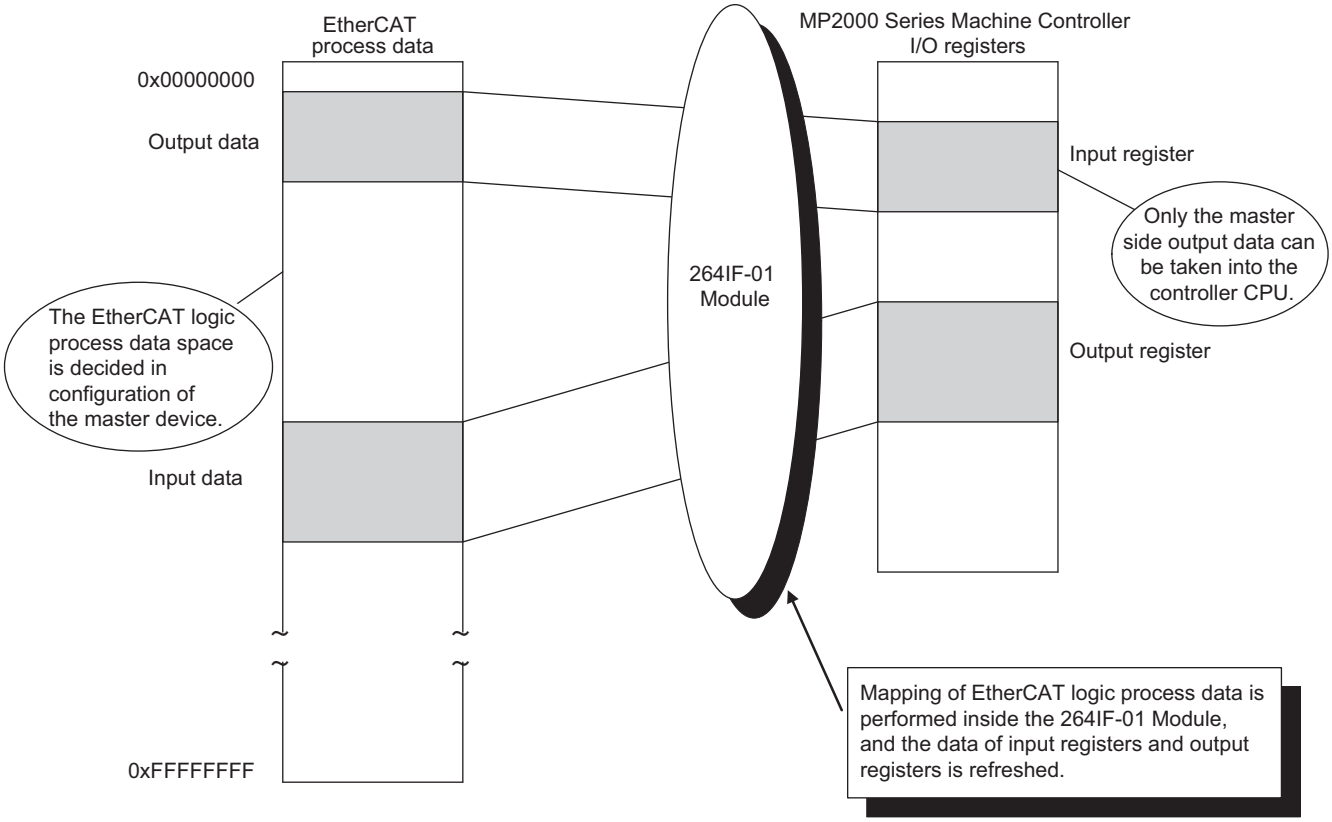

EtherCAT
process data
MP2000 Series Machine Controller
I/O registers
0x00000000
Output data
Input register
Only the master side output data can be taken into the controller CPU.
264IF-01
Module
The EtherCAT logic process data space is decided in configuration of the master device.
Output register
Input data
0xFFFFFFFF
Mapping of EtherCAT logic process data is performed inside the 264IF-01 Module, and the data of input registers and output registers is refreshed.

Fig. 5.2 Mapping of the EtherCAT Logic Process Data Space

5.3.2 Data Refresh Timing

The data refresh timing of the MP2000 Series Machine Controller and EtherCAT transmission lines is shown below.

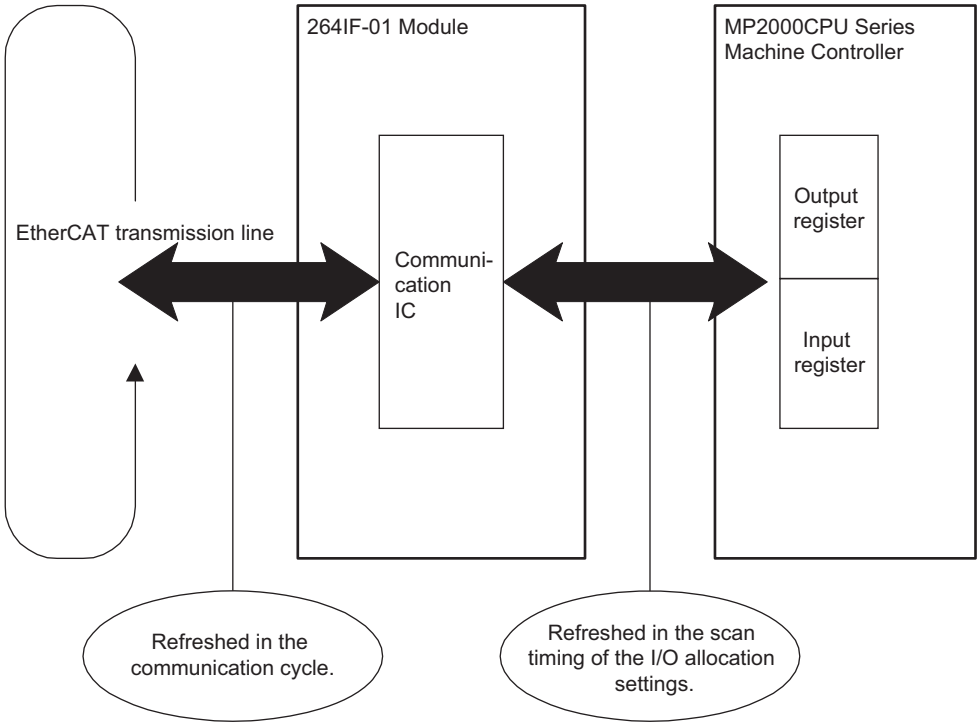


Fig. 5.3 Cyclic Data Refresh Timing of the 264IF-01 Module

■ MP2000 Series Machine Controller ↔ 264IF-01 Module

Data is refreshed in the timing of the scan setting of I/O allocation in the detailed definitions window of the 264IF-01 Module.

■ EtherCAT Transmission Lines ↔ 264IF-01 Module

Data is refreshed in the timing of the EtherCAT communication cycle.

Sandwiching a communications IC, operations between an MP2000 Series Machine Controller and 264IF-01 Module, and between EtherCAT communication lines and the 264IF-01 Module, are asynchronous.

5.3.3 Data Synchronization

The synchronization of data between an MP2000 Series Machine Controller and EtherCAT transmission lines is guaranteed.

5.3.4 Data Refreshing at CPU STOP

When the CPU module has been set in the STOP status, the 264IF-01 Module carries out the following processing.

Table 5.2 Data Refreshing at CPU STOP

"Output status at CPU STOP" Setting in the 264IF-01 Module's Detailed Definitions	Output Data	Input Data
Hold	The final data output before CPU STOP is continued.	There is no refreshing of input registers. At input registers, the final data before CPU STOP is held.
Zero clear	Output of "0" data is continued during the CPU STOP status.	

5.4 Mailbox Communication (Message Communication)

5.4.1 System Messages

Allow reading data from and writing data of the EtherCAT standard system.
The 264IF-01 Module responds automatically to requests from the master node.

5.4.2 User Messages

The standard message function of MP2000 Series Machine Controllers cannot be used.
It is not possible to read from or write to the holding registers of an MP2000 Series Machine Controller from the master node.

6

Troubleshooting

This chapter describes how to troubleshoot problems and take countermeasures against them.

6.1 Status Indication by LED Indicators - 6-2

6.2 System I/O Error Status - 6-3

6.2.1 System I/O Error Status by Controllers - 6-3

6.2.2 Details on I/O Error Status - 6-7

6.1 Status Indication by LED Indicators

The following table provides a description of the 264IF-01 Module status indicated by each LED indicator.

Classification	LED Indication					Meaning	Description
	RUN	ERR	NS*	L/A1	L/A2		
Power ON	○	●	○	–	–	The power is turned ON	The status in which the power to the Module has been turned ON and it is being initialized.
Self-diagnosis	○	○	○	–	–	Self diagnosis in progress	This is the status in which self-diagnosis is in progress after completion of initialization.
Initial Status	●	○	★ Green	–	–	Waiting for initial settings	The status in which the Module, started normally, is waiting for initialization by the CPU Module. NS lights according to changes in the connection status, following the EtherCAT specifications. The L/A1 and L/A2 indicators light according to the connection status.
Normal	●	○	● Green	–	–	Operating normally	The status in which the Module is performing EtherCAT communication normally. The L/A1 and L/A2 indicators light according to the connection status.
Communication Error	●	○	★ Green	–	–	EtherCAT communica-tion status	NS lights in accordance with the EtherCAT state machine. ■ State machine • INIT • PRE-OPERATIONAL • SAFE-OPERATIONAL • OPERATIONAL
Module Abnormal	●	★	–	–	–	Major hardware failure	Number of flashes on error occurrence 1: ROM diagnostic error 2: RAM diagnostic error 3: Shared memory error 4: Communication ASIC diagnosis error
	○	★	–	–	–	Major software error	Number of flashes on error occurrence 3: Address error (reading) exception 4: Address error (writing) exception 5: FPU exception 6: General illegal command exception 7: Illegal slot command exception 8: General FPU suppression exception 9: Slot FPU suppression exception 15: Watchdog time timeout

- ○: Not lit, ●: Lit, ★: Flashing, –: Indefinite

* The NS LED indications conform to the EtherCAT specifications.

6.2 System I/O Error Status

6.2.1 System I/O Error Status by Controllers

The following shows the system I/O error status of the MP2000 Series Machine Controller.
Refer to *3.6.1 Displaying a Register List* and specify a system register number "SWxxxxx" to access.

(1) MP2100M Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IWxxxx register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OWxxxx register number)
Reserved by System	SW00205	(Not used)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	MP2100M Machine Controller error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00228	SVB-01 Module error status
	SW00229 to SW00239	Reserved by the system
	SW00240 to SW00247	Error status of slot 1 of rack 2* (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 2 of rack 2* (Depends on the mounted module and error code.)
	SW00256 to SW00263	Error status of slot 3 of rack 2* (Depends on the mounted module and error code.)
	SW00264 to SW00271	Error status of slot 4 of rack 2* (Depends on the mounted module and error code.)
	...	...
	SW00448 to SW00455	Error status of slot 9 of rack 4* (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using MP2100MEX.

(2) MP2200 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IWxxxx register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OWxxxx register number)
Reserved by System	SW00205	(Not used)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	(Not used)
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00228	Error status of slot 1 of rack 1 (Depends on the mounted module and error code.)
	SW00229 to SW00239	Error status of slot 2 of rack 1 (Depends on the mounted module and error code.)
	SW00240 to SW00247	Error status of slot 3 of rack 1 (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 4 of rack 1 (Depends on the mounted module and error code.)
	...	...
	SW00496 to SW00503	Error status of slot 9 of rack 4* (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using EXIOIF.

(3) MP2300 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IWxxxx register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OWxxxx register number)
Reserved by System	SW00205	(Not used)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status (Depends on the mounted module and error code.)
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00231	Slot 1 error status (Depends on the mounted module and error code.)
	SW00232 to SW00239	Slot 2 error status (Depends on the mounted module and error code.)
	SW00240 to SW00247	Slot 3 error status (Depends on the mounted module and error code.)

(4) MP2310 Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IWxxxx register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OWxxxx register number)
Reserved by System	SW00205	(Not used)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00231	Slot 1 error status
	SW00232 to SW00239	Slot 2 error status
	SW00240 to SW00247	Slot 3 error status
	SW00248 to SW00255	Reserved by the system (Slot 4 error status)
	...	
	SW00456 to SW00463	Reserved by the system (Slot 30 error status)

(5) MP2300S Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IWxxxx register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OWxxxx register number)
Reserved by System	SW00205	(Not used)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	Slot 0 error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00231	Slot 1 error status
	SW00232 to SW00239	Reserved by the system (Slot 2 error status)
	SW00240 to SW00247	Reserved by the system (Slot 3 error status)
	SW00248 to SW00255	Reserved by the system (Slot 4 error status)
	...	
	SW00456 to SW00463	Reserved by the system (Slot 30 error status)

(6) MP2500MD Machine Controller

Name	Register No.	Remarks
I/O Error Count	SW00200	Number of I/O error occurrences
Number of Input Errors	SW00201	Number of input error occurrences
Input Error Address	SW00202	Address of the latest input error (IWxxxx register number)
Number of Output Errors	SW00203	Number of output error occurrences
Output Error Address	SW00204	Address of the latest output error (OWxxxx register number)
Reserved by System	SW00205	(Not used)
	SW00206	
	SW00207	
I/O Error Status	SW00208 to SW00215	MP2500MD Machine Controller error status
	SW00216 to SW00223	Reserved by the system
	SW00224 to SW00228	SVB-01 Module error status
	SW00229 to SW00239	Reserved by the system
	SW00240 to SW00247	Error status of slot 1 of rack 2* (Depends on the mounted module and error code.)
	SW00248 to SW00255	Error status of slot 2 of rack 2* (Depends on the mounted module and error code.)
	SW00256 to SW00263	Error status of slot 3 of rack 2* (Depends on the mounted module and error code.)
	SW00264 to SW00271	Error status of slot 4 of rack 2* (Depends on the mounted module and error code.)
	...	...
	SW00448 to SW00455	Error status of slot 9 of rack 4* (Depends on the mounted module and error code.)

* Racks 2 to 4 can be used only when using MP2100MEX.

6.2.2 Details on I/O Error Status

When a system I/O error occurs, the error status will be written in the system register.
The following shows the register allocation of the error status when the I/O Module (LIO-01/02), the EtherCAT Communication Module (264IF-01), and the DeviceNet Communication Module (260IF-01) are set at slots 1, 2 and 3 of the MP2300 Machine Controller, respectively.

(1) MP2300 Machine Controller Basic Module Error Status

Name	Register No.	Remarks
Slot 0 Error Status	SW00208 to SW00215	(Depends on the mounted module and error code.)
Reserved by System	SW00216 to SW00223	(Depends on the mounted module and error code.)
Slot 1 Error Status	SW00224 to SW00231	(Depends on the mounted module and error code.)
Slot 2 Error Status	SW00232 to SW00239	(Depends on the mounted module and error code.)
Slot 3 Error Status	SW00240 to SW00247	(Depends on the mounted module and error code.)

■ Register Allocation: Slot 0 (Reserved for Basic Module)

(Bit No.)	F ····· 8	7 ····· 0
SW00208	Error code (I/O error = 2)	Subslot No. (= 2)
SW00209	Error code (Station error = 1)	Subslot No. (= 3)

SW00210	ST#15	·····	ST#2	ST#1	Not used
SW00211	Not used	ST#30 ·····		ST#17	ST#16
SW00212	Not used	·····			Not used
SW00213	Not used	·····			Not used
SW00214	Not used	·····			Not used
SW00215	Not used	·····			Not used

(2) LIO-01/LIO-02 Module Error Status (Slot 1)

(Bit No.)	F ····· 8	7 ····· 0
SW00224	Error code (I/O error = 2)	Subslot No. (= 1)
SW00225	Error code (I/O error = 2)	Subslot No. (= 2)

SW00226	ST#15	·····	ST#2	ST#1	Not used
SW00227	Not used	·····			Not used
SW00228	Not used	·····			Not used
SW00229	Not used	·····			Not used
SW00230	Not used	·····			Not used
SW00231	Not used	·····			Not used

(3) 264IF-01 Module Error Status (Slot 2)

(Bit No.)	F ····· 8	7 ····· 0
SW00232	Error code (Station error = 1)	Subslot No. (= 1)
SW00233	Reserved	
SW00234	Communication phases	
SW00235	Data enabled flag	
SW00236	Reserved	

<Details of Communication Phases>

Word	Meaning
0	Non-INIT
1	INIT
2	PRE-OPERATIONAL
3	SAFE-OPERATIONAL
4	OPERATIONAL

<Details of Data Enabled Flag>

Bit	Meaning (When Relevant Bit = ON)
0	0: Process data not yet communicated/1: Process data communication in progress
1 to 15	Reserved

(4) 260IF-01 Module Error Status (Slot 3)

(Bit No.)	F ····· 8	7 ····· 0
SW00240	Error code (Station error = 1)	Subslot No. (= 2)

SW00241	ST#15	·····	ST#0
SW00242	ST#31	·····	ST#16
SW00243	ST#47	·····	ST#32
SW00244	ST#63	·····	ST#48

<Error Status Details>

Item	Code	Description
ST#n	0	Normal communication
	1	Communication error at the station n (n = local station number in slave mode)

Appendices

Appendix A Connection Example - - -

Appendix A Connection Example

This section shows a connection example that uses an embedded PC (model CX-9010) made by Beckhoff Inc. and TwinCAT. An example of an EtherCAT connection system is shown in Fig. A.1.

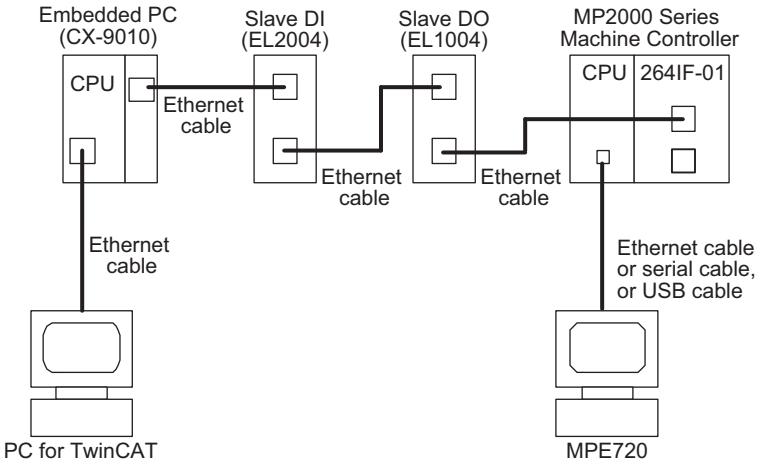


Fig. A.1 Example of EtherCAT Connection System

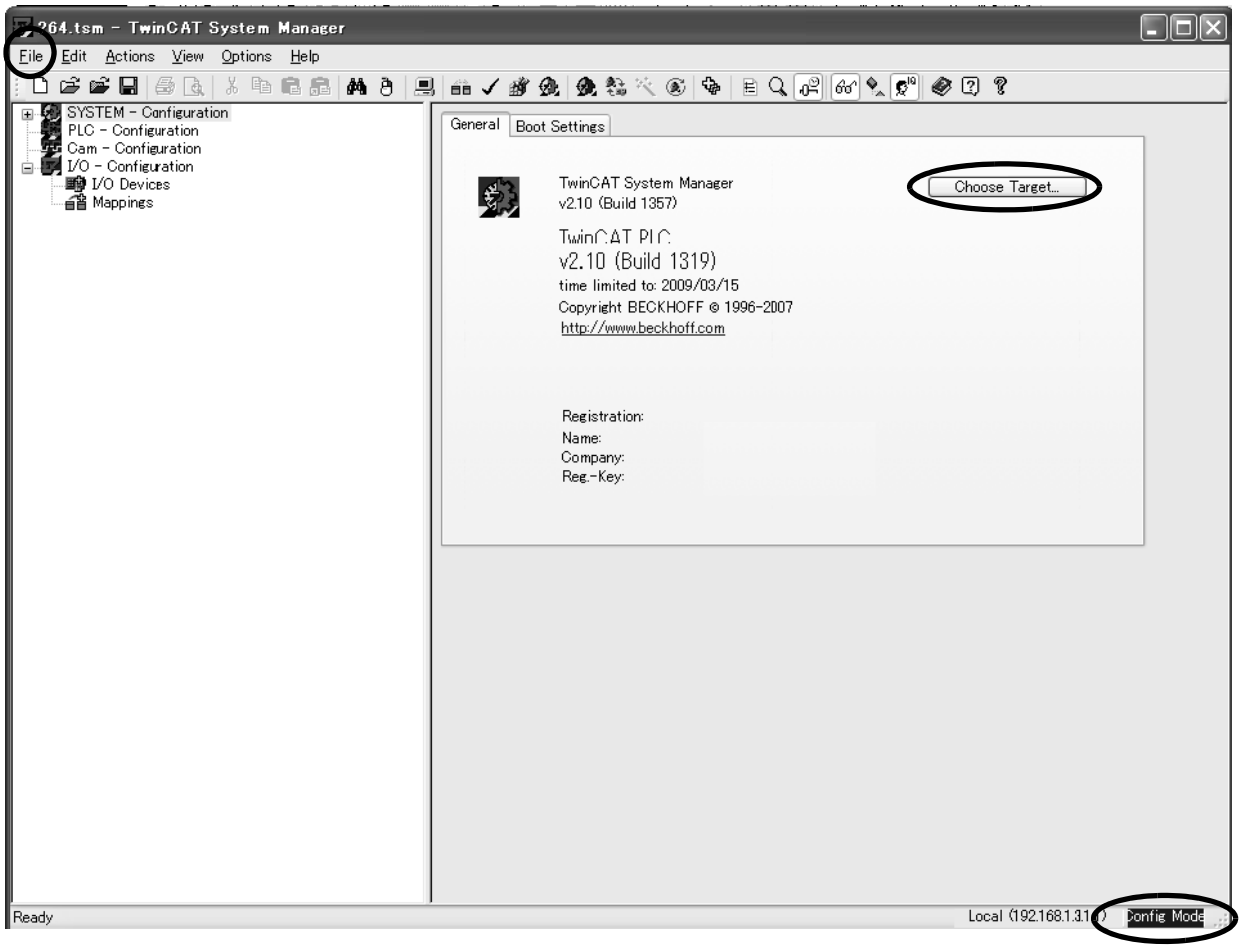
For more information about TwinCAT, contact Beckhoff Inc. or K.mecs Co., Ltd.

Appendix B Connecting a TwinCAT System

Connect to a TwinCAT System by following the procedure below.

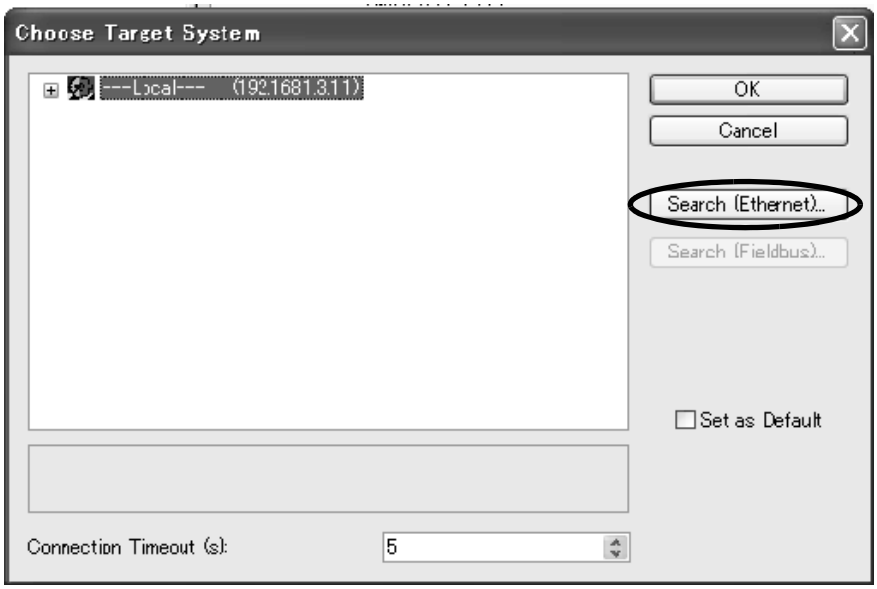
1. Display the main window of TwinCAT System Manager of the master device.
2. Select ***File - New*** from the main menu.
3. Check that **Config Mode** appears at the bottom right of the window.

   If **Config Mode** is not present, select ***Actions - Set/Reset TwinCAT to Run mode*** from the main menu, then set to **Config Mode**.
4. Click the **Choose Target** button.



The **Choose Target System** dialog box will be displayed.

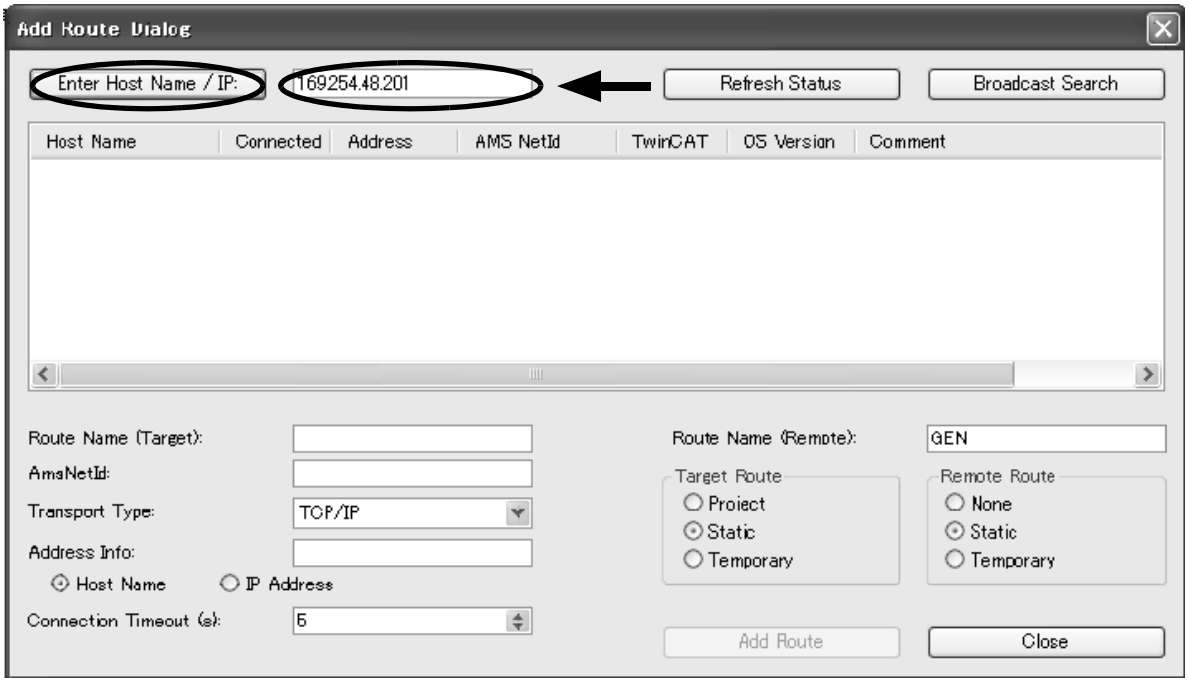
5. Click the **Search (Ethernet)** button.



The **Add Route Dialog** dialog box will be displayed.

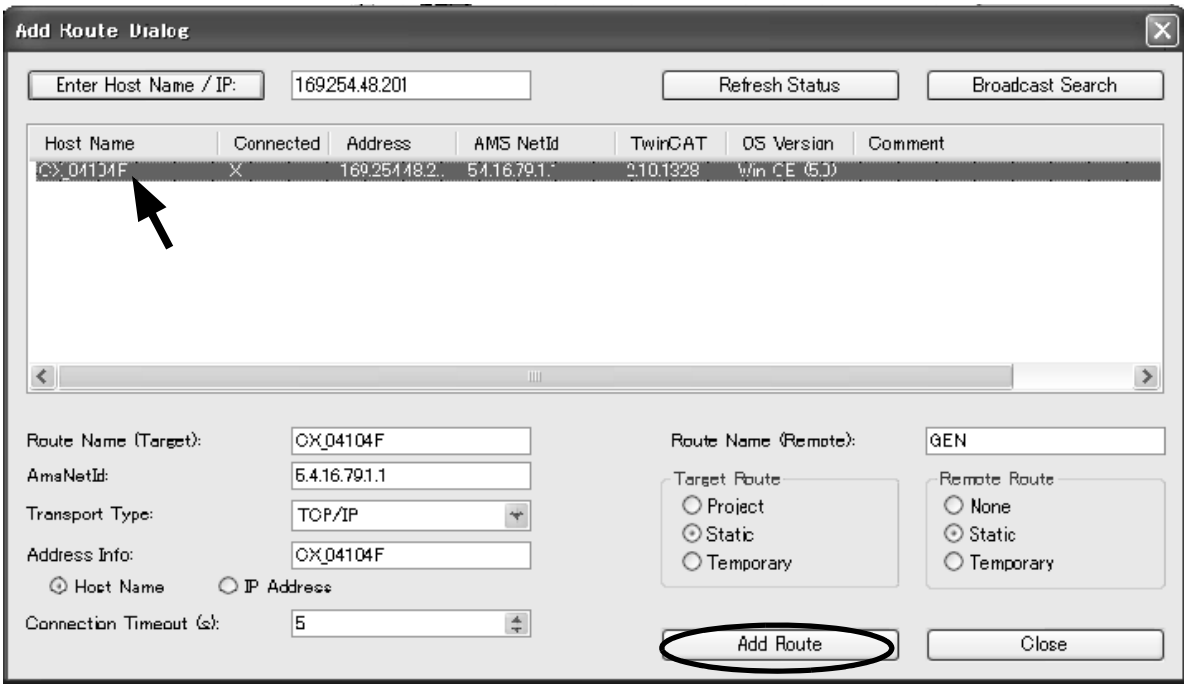
6. Set the IP address of the embedded PC in the **Host Name/IP** field.

7. Click the **Ether Host Name/IP** button.

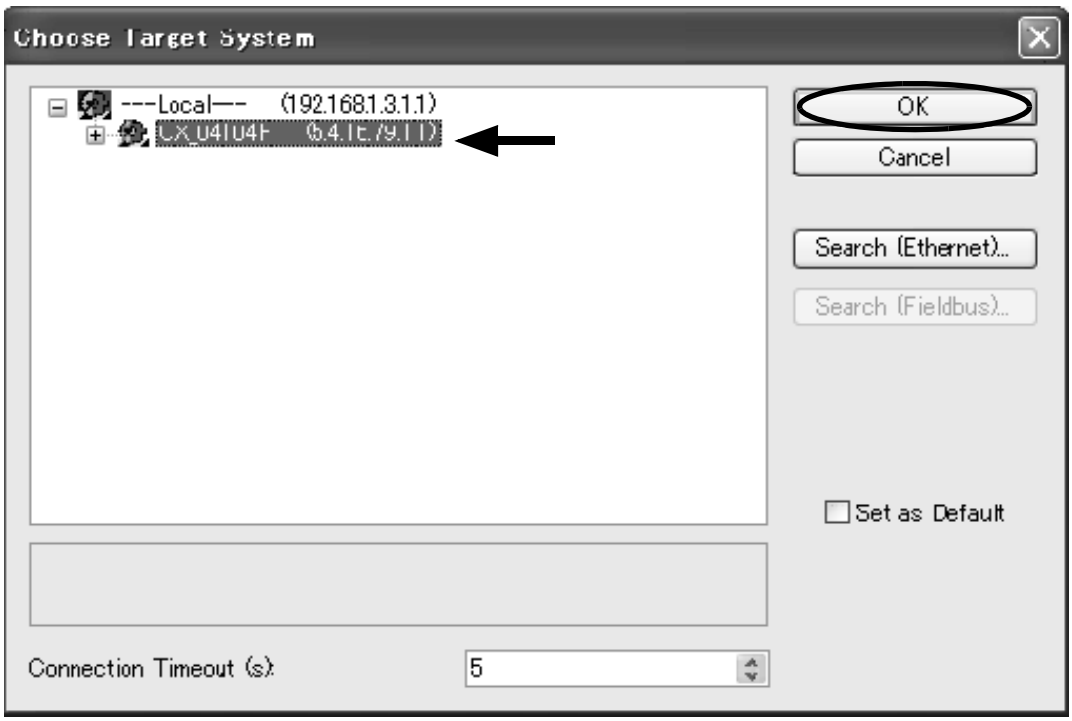


8. Check that the target controller has been detected, then click the relevant controller.

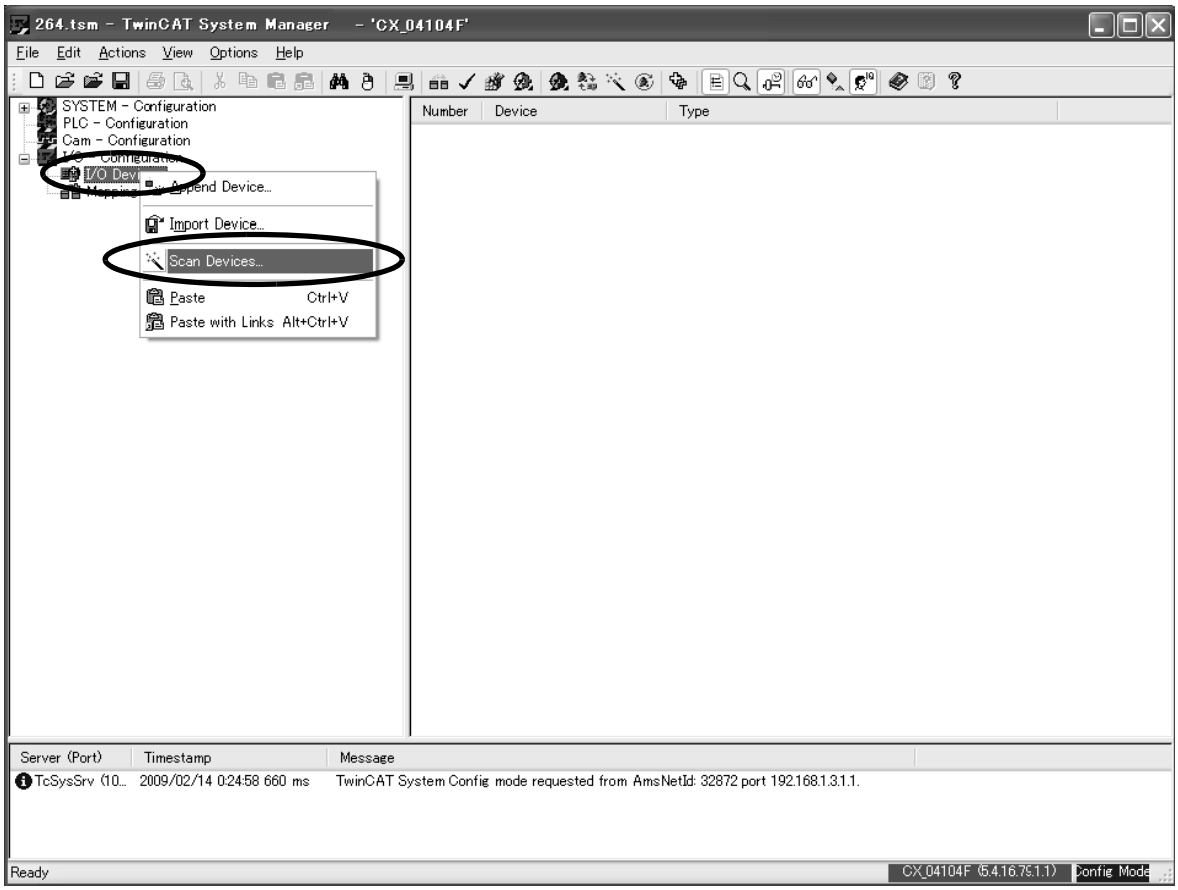
9. Click the **Add Route** button.



10. Select the relevant controller, then click the **OK** button.

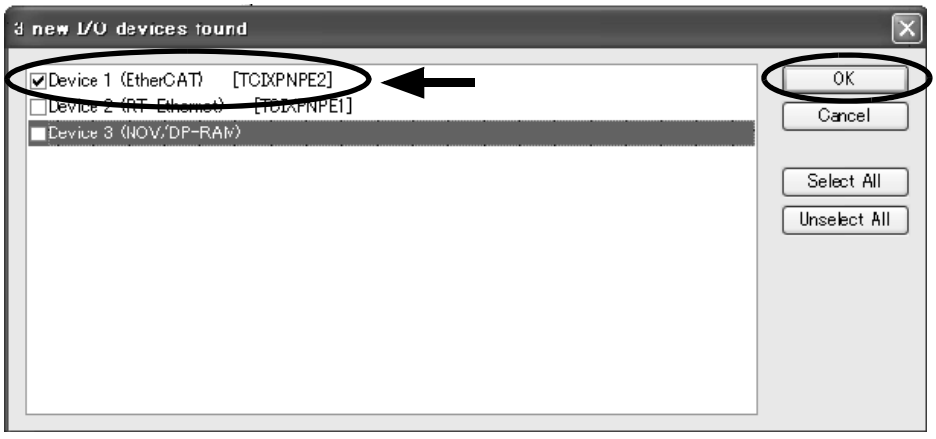


11. Select ***I/O-Configuration - I/O Device*** from the System Manager file menu and right-click it. Select **Scan Devices** from the popup menu that is displayed.

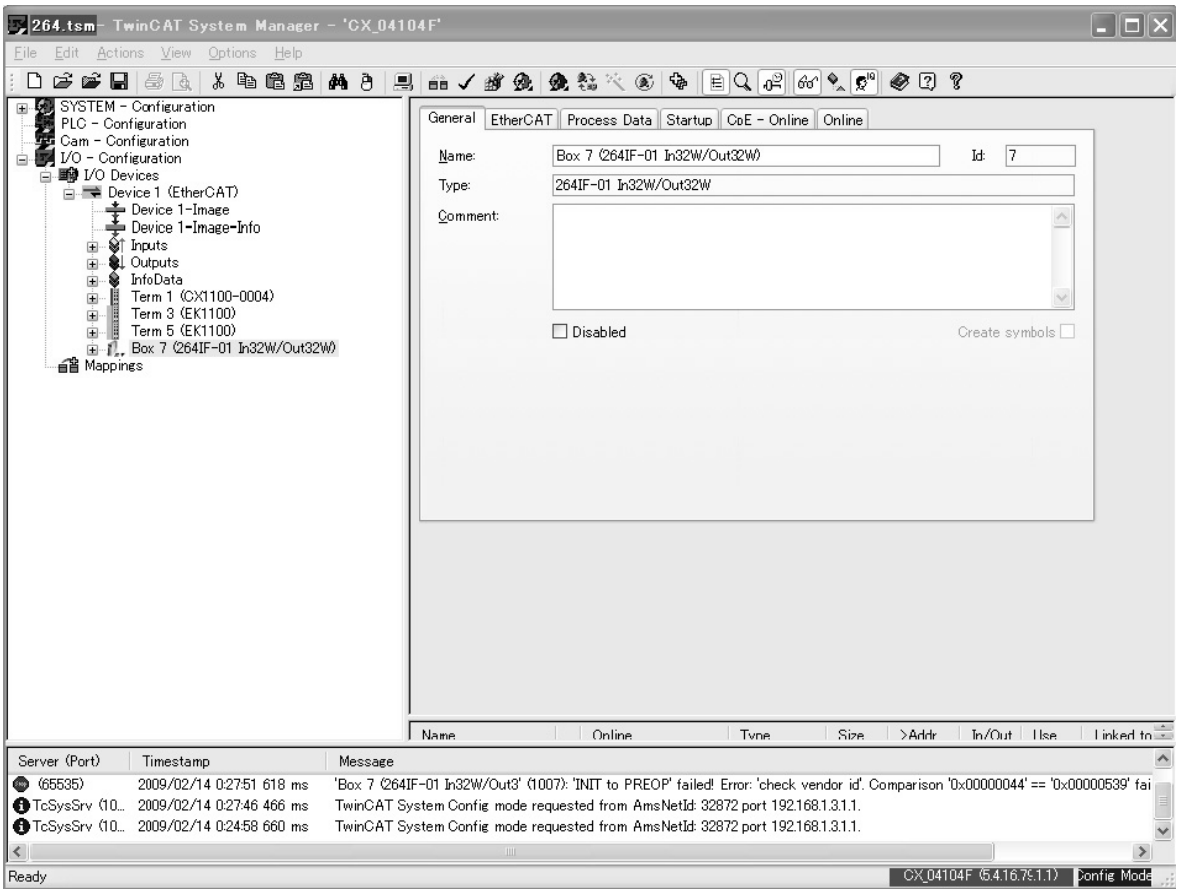


The **3 new I/O devices found** dialog box will be displayed.

12. Enter a checkmark in the **EtherCAT** field and click the **OK** button.



13. The window shown below is displayed, and the slave devices connected to the EtherCAT network are detected.


264.tsm - TwinCAT System Manager - 'CX_04104F'
File Edit Actions View Options Help
SYSTEM - Configuration
PLC - Configuration
Cam - Configuration
I/O - Configuration
I/O Devices
Device 1 (EtherCAT)
Device 1-Image
Device 1-Image-Info
Inputs
Outputs
InfoData
Term 1 (CX1100-0004)
Term 3 (EK1100)
Term 5 (EK1100)
Box 7 (264IF-01 In32W/Out32W)
Mappings
General EtherCAT Process Data Startup CoE - Online Online
Name: Box 7 (264IF-01 In32W/Out32W) Id: 7
Type: 264IF-01 In32W/Out32W
Comment:
Disabled
Create symbols
Server (Port) Timestamp Message
(65535) 2009/02/14 0:27:51 618 ms 'Box 7 (264IF-01 In32W/Out3' (1007): 'INIT to PREOP' failed! Error: 'check vendor id'. Comparison '0x00000044' == '0x00000539' fai
TcSysSrv (10... 2009/02/14 0:27:46 466 ms TwinCAT System Config mode requested from AmsNetId: 32872 port 192.168.1.3.1.1.
TcSysSrv (10... 2009/02/14 0:24:58 660 ms TwinCAT System Config mode requested from AmsNetId: 32872 port 192.168.1.3.1.1.
Ready
CX_04104F (5.4.16.75.1.1)
Config Mode

To allocate a detected slave device or to display the device name on the screen, the device description file (XML file) of the relevant slave device is required. Device description files are provided by the vendors of the individual slave devices.

Through the procedure above, the 264IF-01 Module can be detected in the EtherCAT network. For details, refer to the TwinCAT manual and the manual of the master device.

Appendix C Device Description File

This appendix explains how to customize the data size in the device description file for the 264IF-01 Module.
The device description file (for 32 input words/32 output words) for the 264IF-01 Module is shown on the following page onward. Pay attention to the information in the speech bubbles during customization.

```
<?xml version="1.0"?>
<EtherCATInfo Version="1.2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="EtherCATInf
o.xsd">
  <Vendor>
    <Id>1337</Id>
    <Name>Yaskawa Electric Corporation</Name>
    <ImageData16x14>424DB60300000000000036000000280000001000000000E0000000100200000000000800300000000000000000000
00000000000000000ECE3D1FFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFF
FDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFECE3D1FFDBC6A3FFECE3D1FFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCF
FFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFE8DBC
4FFCFA76CFFE8DBC4FFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFD
FCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFDBC6A3FFC8954BFFE4CEAEFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDF
DFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFD9BA8BFFBE822BFFE8
DBC4FFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFFFDFDFCFF
FDFDFCF
```

```
<RxPdo Fixed="0" Sm="2">
  <Index>#x1600</Index>
  <Name>wOut0</Name>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>1</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output0</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>2</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output1</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>3</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output2</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>4</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output3</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>5</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output4</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>6</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output5</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>7</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output6</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>8</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output7</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2003</Index>
    <SubIndex>9</SubIndex>
    <BitLen>16</BitLen>
    <Name>Output8</Name>
    <DataType>UINT</DataType>
  </Entry>
```

Define the receive process data. The receive process data is the data that is sent from the slave node to the master node.
- "Index #x1600" is fixed.
- For "Name", specify a character string of your choice.

Define the data of each word within <Entry>-</Entry>.
- "Index #x2003" is fixed.
- For "SubIndex", assign numbers in the order 1, 2, 3,… so that there are no duplications.
- For "Name" (data name), assign a name of your choice.
- "Data Type" is fixed as UINT (unsigned, 16-bit).

Define the next receive data.
Create a <Entry>-</Entry> of a size equivalent to the output size.

```
<Entry>
  <Index>#x2003</Index>
  <SubIndex>10</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output9</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>11</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output10</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>12</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output11</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>13</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output12</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>14</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output13</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>15</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output14</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>16</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output15</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>17</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output16</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>18</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output17</Name>
  <DataType>UINT</DataType>
</Entry>
```

```
<Entry>
  <Index>#x2003</Index>
  <SubIndex>19</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output18</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>20</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output19</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>21</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output20</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>22</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output21</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>23</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output22</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>24</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output23</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>25</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output24</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>26</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output25</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>27</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output26</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>28</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output27</Name>
  <DataType>UINT</DataType>
</Entry>
```

```
<Entry>
  <Index>#x2003</Index>
  <SubIndex>29</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output28</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>30</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output29</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>31</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output30</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2003</Index>
  <SubIndex>32</SubIndex>
  <BitLen>16</BitLen>
  <Name>Output31</Name>
  <DataType>UINT</DataType>
</Entry>
</RxPdo>
<TxPdo  Fixed="0"  Sm="3">
  <Index>#x1a00</Index>
  <Name>wIn0</Name>
  <Entry>
    <Index>#x2004</Index>
    <SubIndex>1</SubIndex>
    <BitLen>16</BitLen>
    <Name>Input0</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2004</Index>
    <SubIndex>2</SubIndex>
    <BitLen>16</BitLen>
    <Name>Input1</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2004</Index>
    <SubIndex>3</SubIndex>
    <BitLen>16</BitLen>
    <Name>Input2</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2004</Index>
    <SubIndex>4</SubIndex>
    <BitLen>16</BitLen>
    <Name>Input3</Name>
    <DataType>UINT</DataType>
  </Entry>
  <Entry>
    <Index>#x2004</Index>
    <SubIndex>5</SubIndex>
    <BitLen>16</BitLen>
    <Name>Input4</Name>
    <DataType>UINT</DataType>
  </Entry>
```

Define the final data. (32nd item)

Define the send process data. The send process data is the data that is sent from slave nodes to the master node.
- "Index #x1a00" is fixed.
- For “Name”, specify a character string of your choice.

Define the data of each word within <Entry>-</Entry>.
- "Index #x2004" is fixed.
- For "SubIndex", assign numbers in the order 1, 2, 3,… so that there are no duplications.
- For "Name" (data name), assign a name of your choice.
- "Data Type" is fixed as UINT (unsigned, 16-bit).

Define the next send data. Create a <Entry>-</Entry> of a size equivalent to the input size.

```
<Entry>
  <Index>#x2004</Index>
  <SubIndex>6</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input5</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>7</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input6</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>8</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input7</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>9</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input8</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>10</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input9</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>11</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input10</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>12</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input11</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>13</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input12</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>14</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input13</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>15</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input14</Name>
  <DataType>UINT</DataType>
</Entry>
```

```
<Entry>
  <Index>#x2004</Index>
  <SubIndex>16</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input15</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>17</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input16</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>18</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input17</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>19</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input18</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>20</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input19</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>21</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input20</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>22</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input21</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>23</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input22</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>24</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input23</Name>
  <DataType>UINT</DataType>
</Entry>
<Entry>
  <Index>#x2004</Index>
  <SubIndex>25</SubIndex>
  <BitLen>16</BitLen>
  <Name>Input24</Name>
  <DataType>UINT</DataType>
</Entry>
```

```
            <Entry>
              <Index>#x2004</Index>
              <SubIndex>27</SubIndex>
              <BitLen>16</BitLen>
              <Name>Input26</Name>
              <DataType>UINT</DataType>
            </Entry>
            <Entry>
              <Index>#x2004</Index>
              <SubIndex>28</SubIndex>
              <BitLen>16</BitLen>
              <Name>Input27</Name>
              <DataType>UINT</DataType>
            </Entry>
            <Entry>
              <Index>#x2004</Index>
              <SubIndex>29</SubIndex>
              <BitLen>16</BitLen>
              <Name>Input28</Name>
              <DataType>UINT</DataType>
            </Entry>
            <Entry>
              <Index>#x2004</Index>
              <SubIndex>30</SubIndex>
              <BitLen>16</BitLen>
              <Name>Input29</Name>
              <DataType>UINT</DataType>
            </Entry>
            <Entry>
              <Index>#x2004</Index>
              <SubIndex>31</SubIndex>
              <BitLen>16</BitLen>
              <Name>Input30</Name>
              <DataType>UINT</DataType>
            </Entry>
            <Entry>
              <Index>#x2004</Index>
              <SubIndex>32</SubIndex>
              <BitLen>16</BitLen>
              <Name>Input31</Name>
              <DataType>UINT</DataType>
            </Entry>
          </TxPdo>
          <Mailbox>
            <CoE SdoInfo="1" CompleteAccess="1"/>
          </Mailbox>
          <ImageData16x14>424DB6030000000000003600000028000000100000000E00000001002000000000080030000000000
0000000000000000000000000000FDFDFDFFFFFFFFFFFC8C9C9FFE9EAEAFFD5DADAFFFDFDFDFFFFFFFFFF747676FF8A909
1FF747676FFAEB5B6FFFFFFFFFFFFDFDFDFF747676FFFFFFFFFFFFDFDFDFFFFFFFFFFC8C9C9FF303030FF7B8B8CFF95A5
A7FFD5E5E5FFFDFDFDFFD5DADAFF4B4B4BFF8A9091FFAEB5B6FFE9EAEAFFD5DADAFF000000FF8A9091FFFDFDFDFFF
FFFFFFF95A5A7FF303030FF747676FFAEB5B6FFD5E5E5FFD5DADAFFFDFDFDFF4B4B4BFF303030FF303030FFE9EAEAFFA
EB5B6FF000000FF000000FF95A5A7FFFFFFFFFFFFFFFFFFFF303030FF747676FF95A5A7FFD5E5E5FFD5DADAFFCAD5D5FFE
9EAEAFFE9EAEAFFE9EAEAFFFFFFFFFFFFDFDFDFFE9EAEAFFE9EAEAFFE9EAEAFFFFFFFFFFFFDFDFDFF303030FF747676
FF95A5A7FFD5E5E5FFD5DADAFFAEB5B6FFCAD5D5FFE9EAEAFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFF303030FF747676FFAEB5B6FFD5E5E5FFD5E5E5FFAEB5B6FFC8C9C9FFE9EAEAFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDFDFDFF303030FF7B8B8CFFAEB5B6FFD5E5E5FFB8
C9CAFFAEB5B6FFE9EAEAFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF747676FF8
A9091FF8A9091FFD5E5E5FFD5E5E5FFCAD5D5FF7B8B8CFFD5DADAFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFDFDFDFF8A9091FF4B4B4BFF303030FFD5E5E5FFD5DADAFFC8C9C9FF747676FFC8C9C9FFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDFDFDFFFDFDFDFFFFFFFFFF303030FF303030FF303030FFD5E5E5FFB8C9C
AFFC8C9C9FF747676FFC8C9C9FFFFFFFFFFFDFDFDFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDFDFDFF8A9
091FF95A5A7FF95A5A7FFAEB5B6FFB8C9CAFFB8C9CAFF747676FFC8C9C9FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFDFDFDFFFFFFFFFFFFFFFFFFFFFFFFFFFFFD5E5E5FF8A9091FF95A5A7FF95A5A7FFAEB5B6FF747676FFC8C9C9FFF
DFDFDFFFDFDFDFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDFDFDFFFDFDFDFFB8C9CA
FF95A5A7FF747676FF747676FFB8C9CAFFFDFDFDFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFDFDFDFFFDFDFDFFFDFD
FDFFFDFDFDFFFDFDFDFFFDFDFDFFFDFDFDFFE9EAEAFFAEB5B6FFC8C9C9FFFDFDFDFFFDFDFDFFFDFDFDFFFDFDFD
FFFDFDFDFFFDFDFDFFFDFDFDFF</ImageData16x14>
        </Device>
      </Devices>
    </Descriptions>
</EtherCATInfo>
```

Define the final data. (32nd item)

Appendix D Transition in EtherCAT Communication Status

When a state transition request for transition to the next communication status is issued from the EtherCAT master device, or a transition to the next communication status occurs as the result of a cable disconnection, the 264IF-01 Module resets the communication IC. Because of this the communication status temporarily becomes INIT, then transition to the specified communication status takes place as shown below.
The transition of communication statuses depends on the settings of the master device.

- Transition from OPERATIONAL to PRE-OPERATIONAL
- Transition from OPERATIONAL to Safe-OPERATIONAL
- Transition from OPERATIONAL to INIT

However, depending on the transition timing, there may be cases where a state transition request is received from the master device during resetting of the communication IC of the 264IF-01 Module, in which case transition to the specified status will not take place, and state transition will be stopped in an error status. If this happens, issue any state transition request from the master device again.

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264IF-01 USER'S MANUAL

IRUMA BUSINESS CENTER (SOLUTION CENTER)
480, Kamifujisawa, Iruma, Saitama 358-8555, Japan
Phone 81-4-2962-5696 Fax 81-4-2962-6138

YASKAWA ELECTRIC AMERICA, INC.
2121 Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone (800) YASKAWA (800-927-5292) or 1-847-887-7000 Fax 1-847-887-7370

YASKAWA ELÉTRICO DO BRASIL LTDA.
Avenida Fagundes Filho, 620 São Paulo-SP CEP 04304-000, Brazil
Phone 55-11-3585-1100 Fax 55-11-5581-8795

YASKAWA ELECTRIC EUROPE GmbH
Hauptstraβe 185, 65760 Eschborn, Germany
Phone 49-6196-569-300 Fax 49-6196-569-398

YASKAWA ELECTRIC UK LTD.
1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, United Kingdom
Phone 44-1236-735000 Fax 44-1236-458182

YASKAWA ELECTRIC KOREA CORPORATION
7F, Doore Bldg. 24, Yeoido-dong, Youngdungpo-Ku, Seoul 150-877, Korea
Phone 82-2-784-7844 Fax 82-2-784-8495

YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.
151 Lorong Chuan, #04-02A, New Tech Park 556741, Singapore
Phone 65-6282-3003 Fax 65-6289-3003

YASKAWA ELECTRIC (SHANGHAI) CO., LTD.
No.18 Xizang Zhong Road. Room 1702-1707, Harbour Ring Plaza Shanghai 200001, China
Phone 86-21-5385-2200 Fax 86-21-5385-3299

YASKAWA ELECTRIC (SHANGHAI) CO., LTD. BEIJING OFFICE
Room 1011A, Tower W3 Oriental Plaza, No.1 East Chang An Ave.,
Dong Cheng District, Beijing 100738, China
Phone 86-10-8518-4086 Fax 86-10-8518-4082

YASKAWA ELECTRIC TAIWAN CORPORATION
9F, 16, Nanking E. Rd., Sec. 3, Taipei, Taiwan
Phone 886-2-2502-5003 Fax 886-2-2505-1280

YASKAWA ELECTRIC CORPORATION

YASKAWA

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